1973

Forest Trees of Maine, 1973

Maine Forestry Department

FOREST TREES of MAINE

Bulletin 24
(Tenth Edition)
MAINE FORESTRY DEPARTMENT
AUGUSTA, MAINE
1 9 7 3

FOREWORD

It was sixty-five years ago, 1908, that the first edition of FOREST TREES OF MAINE came off the press and was distributed as free material. The popularity and use of this publication has resulted in nine editions and now it is a pleasure to present the tenth.

This comes at an appropriate time when conservation of natural resources is the responsibility of everyone. We are in an economic era of rapid change and rapid growth. The multiple-use concept of our forests for timber, recreation, wildlife, and water supply values should be carried out in proportion to the dominant importance in the area. This publication should serve the useful purpose of stimulating greater appreciation of trees and forests which are basic to the ecology of most of Maine.

Here in Maine, the forest resource is the base for the number one economy of the State. A re-inventory of the total timber resource was recently completed by the U.S. Forest Service—the printed report "The Timber Resources of Maine" 1972 is available here on request.

It is hoped that many will avail themselves of "Forest Trees of Maine." Its size is particularly adapted for field use as well as for the classroom and the home. The Augusta office will handle requests as long as the supply lasts.

FRED E. HOLT,
Forest Commissioner

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Bulletin 24
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MAINE FORESTRY DEPARTMENT, 1973

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INTRODUCTION

This edition is the second one issued as a numbered bulletin, and, except for many improved sketches of leaves, is essentially the same as the 1968 edition. Some details of previous editions are given on page 88. Retained are sketches of protected species and of poison-ivy and poison-sumac given at the beginning. The latter two are to warn people, before they pick up such specimens for identification, from receiving unwanted results from handling the two plants. Added in this edition are Properties of Wood, Firewood, and a group listing of native and exotic trees and some native shrubs and hybrids.

Goal with each edition has been accuracy. Particular appreciation is due Dr. Fay Hyland, Professor Emeritus of Botany, Univ. of Maine for technical advice and Joseph Lupsha, Utilization Forester, Maine Forestry Dept., for information on Maine uses of wood.

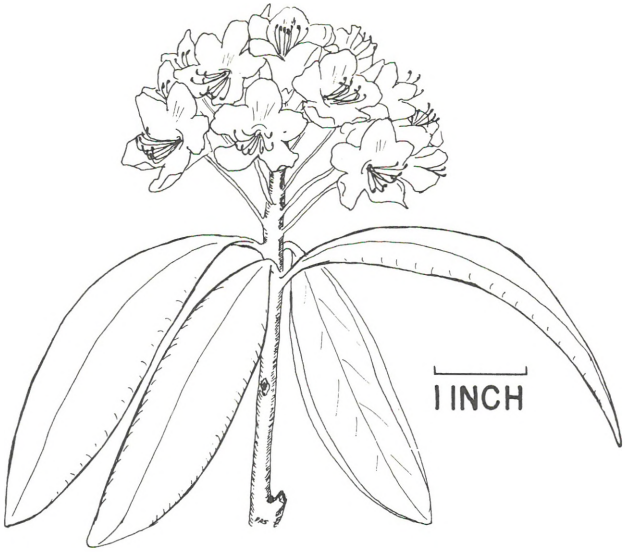
Names of native trees are those in "Check List of . . . Trees of the United States . . .," Agr. Handbook 41, 1953, U. S. Forest Serv., by E. L. Little. Distribution records are from "Revised Check List of the Vascular Plants of Maine," 1966, Bull. 8, Josselyn Bot. Soc., Orono, by Bean, Richards and Hyland.

All trees native to Maine are included, numbering 14 conifers and 57 broadleaf species. In addition, there are 29 commonly-planted exotics; 13 other native varieties, hybrids, dwarf or shrub species are mentioned. No attempt has been made to include all the species in difficult groups such as Willows & Hawthorns. Dwarf or shrubby forms, hybrids, and varieties of native trees, plus exotic trees are in bold face type. Other exotics may be encountered. However, the "Summer Key" is limited to the trees covered herein. More complete keys and information can be found in the references on page 86.

The Maine Forestry Department (Maine Forest Service) offers advice pertaining to tree identification, planting, protection and management.

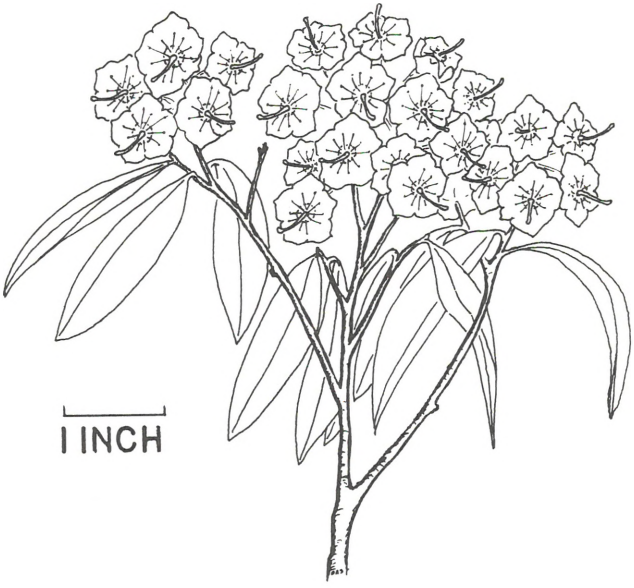
PROTECTED SPECIES

For descriptions and statute see page 78



ROSEBAY RHODODENDRON OR GREAT LAUREL

Rhododendron maximum L.



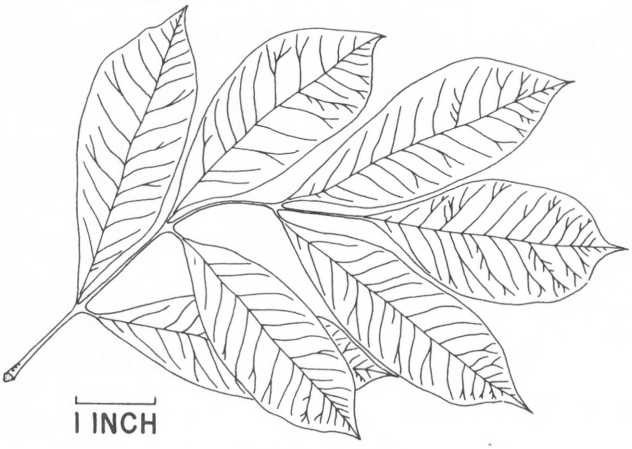
MOUNTAIN LAUREL

Kalmia latifolia L.

POISONOUS SPECIES

For descriptions see page 68

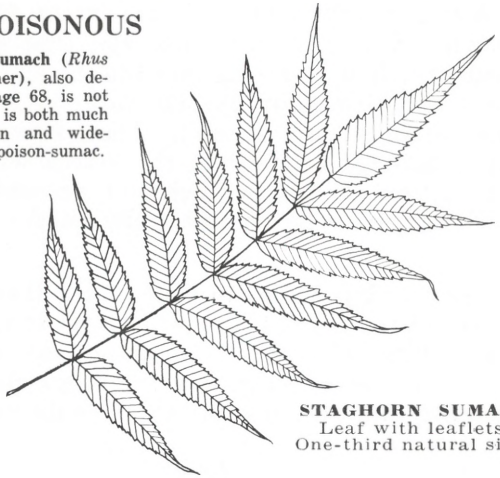
POISON-OAK
Toxicodendron radicans (L.) Ktze.



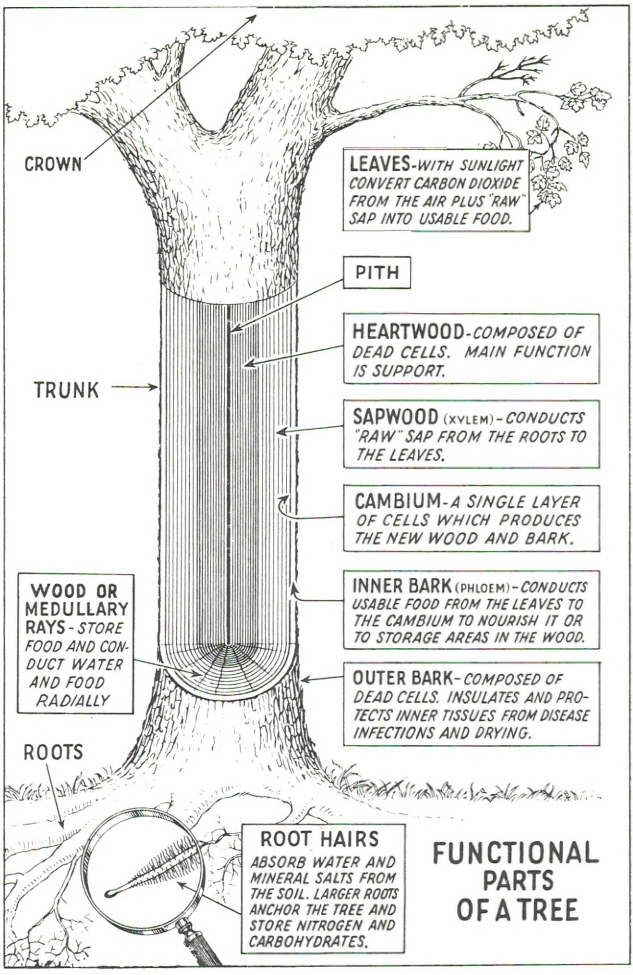
POISON-SUMAC
Toxicodendron vernix (L.) Ktze.

NON-POISONOUS

Staghorn Sumach (*Rhus typhina* Torner), also described on page 68, is not poisonous. It is both much more common and widespread than poison-sumac.



STAGHORN SUMAC
Leaf with leaflets
One-third natural size.



TREE PARTS AND FUNCTIONS

A tree has three major parts: roots, trunk, and crown. *Large roots* anchor the tree and store foods which are manufactured in the leaves. *Small roots* and *root hairs* absorb water and dissolved mineral salts from the soil. These raw materials are conducted upward to the leaves where they are utilized in the synthesis of necessary plant food. Air must be present in the soil for the roots to live.

The *trunk* is the main body of the tree. In the center of the trunk is the *pith*. Next to the pith is the *heartwood* which is composed of dead cells and serves as support. On the outer side of the heartwood is the *sapwood* which contains the sap-

conducting tubes. Sapwood is usually lighter in color, but it darkens with age and becomes heartwood. Heartwood and sapwood together comprise the *xylem*. Outside the sapwood is the *cambium*, a thin layer of cells, which annually produces new sapwood inwardly and new *inner bark* outwardly. The cambium produces diameter growth, and callus growth around open wounds. The *inner bark* or *phloem* is outside the cambium and carries food from the leaves downward to nourish the cambium and growing parts. The *outer bark* is the outer-most part of the tree. Essentially, it is composed of dead cork cells and protects the inner bark from mechanical injury, drying, or disease; it also insulates it from extremes of heat and cold. Damage to the inner bark (phloem) causes interference with food movement to growing parts below the injury. Girdling of a tree through its inner bark will kill the tree. *Wood* or *medullary rays* radiate out from the center, and serve in lateral conduction and as food storage areas. They are most conspicuous in a cross-sectional view.

The *crown* is composed of branches, twigs, buds, leaves, flowers and fruit. The process of *photosynthesis* occurs in the leaves. From energy produced by sunlight the *leaves* combine carbon dioxide from the air and water from the soil to produce *carbohydrates*. These plus fats and proteins are the plant foods necessary for growth and respiration of the tree. *Flowers* and *fruit* are important in reproduction.

The *yearly growth* of a tree can be compared to the annual placement of hollow wooden cones one on top of the other. Each cone would represent a single year's growth over the entire stem. At the beginning of each new growth period, new wood cells are at first large and thin-walled and form the *springwood* or *earlywood*. As the growing season progresses, the smaller, thicker-walled cells of the *summerwood* or *latewood* are produced. The darker appearance of the latewood delineates the *annual ring* of growth put on by a tree. The age of a tree, at any desired point along the trunk, can be determined by counting these annual rings.

SUMMER KEY

Numbers at left are **paired** and give opposing characteristics to look for. **Starting** with numbers 1, select the description that fits your specimen and proceed to the number given on the right until the common group name (e.g. maple) is reached. Turn to the given page number for **species keys.** Use average material for analysis. Rule for measurements on inside back cover. **See Glossary - page 8.**

1. Leaves are needle-, awl- or scale-like; conifers .. 2
1. Leaves are broad and veined, not as above; hardwoods or broad-leaf trees 9
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2. Leaves awl- or scale-like, or both 7
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5. Leaves occur in clusters, also singly in larch .. 6
6. Leaves in clusters of 2 to 5 with papery sheath at base[1] ..... *Pine* p. 10
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11. Leaf margin lobed or entire 12
12. Leaf margin lobed ..... *Maple* p. 69
12. Leaf margin entire ..... *Dogwood* p. 77
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13. Leaves pinnate 14
14. Leaflets 3-5, lobed, coarse teeth .... *Boxelder* p. 75
14. Leaflets 5-13 ..... *Ash* p. 80
15. Leaves simple 16
15. Leaves compound 37
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16. Leaf margin toothed or serrate 25
17. Leaf margin entire 18
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19. Pith not diaphragmed 20
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20. Leaves 4-8 inches long .. *Rhododendron* p. 78
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21. Leaf margin lobed or wavy throughout 22
22. Leaf petiole hollow and covers bud; numerous main leaf veins radiate from base .... *Sycamore* p. 57

[1] Papery sheath on white pine drops in late August.
[2] Larch leaves are borne singly on elongating shoots.

22. Leaf petiole neither swollen nor hollow; leaves with one main vein 23
23. Leaf tip flat or notched; pith diaphragmed .... *Yellow-Poplar* p. 45
23. Leaf tip not flat; pith solid 24
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24. Twigs round, spicy odor and taste; leaves 0-3 lobed ..... *Sassafras* p. 56
25. Leaf margin singly toothed or serrate 26
25. Leaf margin doubly serrate 32
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26. Teeth not hooked; fruit not a bur 28
27. Pith star-shaped; buds blunt; bark brown .... *Chestnut* p. 44
27. Pith round; buds long, pointed; bark gray .... *Beech* p. 43
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28. Leaf base even; pith symmetric in cross section 29
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GLOSSARY

Abortive (fruit). Not developed completely.

Alternate (arrangement of leaves, buds). Not opposite on sides of twig.

Awl-shaped (leaf). Narrow and tapering to a sharp point.

Basal disc (fruit). A plate-like structure on the base of a fruit.

Bloom. A whitish covering; usually on new shoot growth or fruit.

Bract. A leaf-like structure which is attached to a flower, a fruit, or to its stalk.

Branchlet. Shoot growth of the latest growing season.

Bur (fruit). A prickly or spiny husk enclosing the seed.

Capsule (fruit). A dry fruit enclosing more than one seed and splitting freely at maturity.

Catkin. A compact, cylindrical cluster of flowers of the same sex.

Chambered (pith). With hollow cavities separated by discs or plates.

Compound (leaf). A leaf composed of smaller leaf units or leaflets.

Conical. Wide at the base and gradually tapering to a point; circular in cross section.

Conifer. Cone bearing trees; the so-called "evergreens."

Cordate (leaf). Heart-shaped at the petiole end or base.

Cup (fruit). The scaled, concave basal portion of oak fruit.

Cyme. A flattened flowering structure, center flowers bloom earliest.

Deciduous (trees). All leaves drop in the autumn; not evergreen.

Diaphragmed (pith). Solid but divided into sections by firmer discs.

Drupe (fruit). Fleshy outside, hard and stone-like inside.

Ellipsoid. Tapers equally at both ends; more than twice as long as broad.

Elliptical. Like an ellipse; flat and tapering equally at both ends.

Entire (leaf). Margin of leaf without teeth, lobes, or divisions.

Fascicle (leaf). A cluster of conifer leaves.

Fluted (stem). With alternating, rounded depressions and ridges; sinuate.

Fruit. The seed-bearing part of a tree.

Glands. Generally raised structures at the tips of hairs, or on a leaf, petiole, or twig.

Globose. Spherical or globe-shaped.

Habitat. Environmental type, e.g. rocky, moist, well-drained, etc.

Head. A compact aggregate of flowers or fruit on a common stalk.

Husk (fruit). The somewhat leathery, outer covering of a fruit sometimes capable of splitting along well-defined lines.

Lance-shaped. Long and tapering; several times longer than broad; broadest at the base.

Leaf. Stalk and blade of hardwoods; needles and scales of conifers.

Leaflets. Smaller leaf units which together form a compound leaf.

Lenticel (bark). Corky, raised pores on woody parts with openings for air-gas exchange.

Linear (leaf). Much longer than broad with parallel margins.

Lobed (leaf). With large, rounded or pointed projections along the leaf-margin. Projection formed by indentations of the leaf margin.

Margin (leaf). The edge, perimeter, or portion forming the outline.

Midrib (leaf). The large central vein.

Oblong. Longer than wide with nearly parallel sides.

Obovate. Egg-shaped in outline; broadest above the middle.

Opposite (arrangement of leaves, buds). Directly across from one another on a common axis, or twig.

Oval. Somewhat elliptical; less than twice as long as broad.

Ovate. Egg-shaped in outline; broadest below the middle.

Ovoid. An egg-shaped solid.

Palmate (leaf) (veins). Compound, with leaflets originating at the same point on a common stalk. Veins originating at a common point at base of leaf blade.

Petiole (leaf). The stalk that supports the leaf blade.

Pinnate (leaf) (vein). Compound, with leaflets along a common rachis or stalk. Veins originating along a common mid-vein.

Pistillate. Containing female portions of flowers, or the pistils.

Raceme. Numerous stalked flowers or fruit along a common axis.

Rachis. The common stalk in a compound leaf to which the leaflets are attached.

Ranked (leaves). Arranged in rows on some conifers.

Samara. A winged fruit e.g. ash, maple.

Scales (bud). Small, modified leaves on the outer surface of buds.

Scales (cone). The basic structures that enclose the seeds.

Scale-like (leaf). Small, generally overlapping, triangular-shaped leaves of some conifers.

Seed. That part of the fruit capable of germinating and producing a new plant.

Serrate (leaf). Margins with a saw-tooth outline. *Doubly serrate,* with small teeth on the larger teeth.

Simple (leaf). A single leaf composed of a single blade. Not compound.

Smooth. Without hairs, glands, or any roughness.

Solid (pith). Without cavities or sections separated by discs.

Spur. A short, extremely slow-growing, woody twig projection.

Staminate. Containing male portions of flowers, or the stamens.

Stipule. A tiny, leafy, sometimes spiny projection arising at the base of a petiole.

Stone. The "bony" pit of drupes.

Toothed (leaf). With moderate projections along the margin.

Umbel. A group of flowers or fruit whose stalks have a common point of attachment.

Unequal (leaf base). Base parts of blade on either side of midrib are uneven.

Valve-like (bud scales). Meet at their margins and do not overlap.

Wavy (leaf margin). Undulating but smooth; not toothed nor lobed.

Whorl (leaves or branches). More than two originating at the same level on a common axis.

PINES

The Important Distinctions

EASTERN WHITE PINE Pinus strobus L.	**RED PINE** Pinus resinosa Ait.	**PITCH PINE** Pinus rigida Mill.	**JACK PINE GRAY PINE** Pinus banksiana Lamb.
Leaves	**Leaves**	**Leaves**	**Leaves**
In clusters of 5, 3-5 inches long, slender, flexible of bluish green color. Sheath at base sheds in late August.	In clusters of 2, 4-6 inches long, flexible, straight, dark green. Sheath persists.	In clusters of 3, 3-5 inches long, stout, not flexible, usually twisted, grow at nearly right angles to the branchlets, dark yellow-green. Sheath persists.	In clusters of 2, ¾-1½ inches long, stout, flat, twisted, light yellow green at first, later becoming dark green. Sheath persists.
Cones	**Cones**	**Cones**	**Cones**
4-8 inches long, and borne on a long stalk, thin smooth scales without prickles.	1½-2¼ inches long, borne on short stalks; scales without prickles. Several basal scales remain on branches when cones drop.	1½-3½ inches long, borne on a short stalk, having prickles on the cone scales, flat-based when completely open. Often remain on branches for 10-12 years.	1½-2 inches long, much curved inward, without stalk. Prickles minute. Often remain on branches for many years.

All of our pines have winged seeds and a papery sheath at the base of each leaf cluster.

Scotch (Scots) Pine (Pinus sylvestris L.) is a native of northern Europe, and there grows to a tall timber tree in dense stands. It will grow on very poor soils. There are many strains of this species, some producing poor growth habits. This plus its susceptibility to snow, porcupine, and bird injury makes it undesirable to plant for timber production. Some strains are planted for Christmas trees.

The foliage is usually a dull blue-green. Needles are short, stiff, twisted, 1½-3 inches long and borne in fascicles of 2. Cones are 1½-2 inches long and numerous, even on comparatively young trees. The bark in the crown region of medium to large trees is of a conspicuous orange-brown coloration.

Austrian Pine (Pinus nigra Arnold), a native of Europe, has been planted as a decorative tree. It makes rapid growth even on very poor soils, and will flourish on limestone soils, or in the smoke of cities and factories. It also grows well near the sea because of its tolerance to salt spray.

The foliage is very dense and dark green, almost black in color. The long, sharp-pointed leaves are borne in fascicles of 2 and do not break cleanly when doubled between the fingers.

It closely resembles our native red pine, but the bark is darker brown to black and buds are pitch-covered. Cones are 2-3½ inches long, armed with sharp prickles.

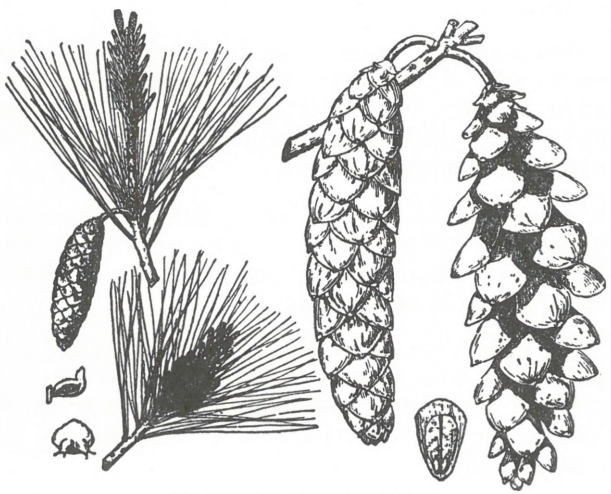
Mugo Pine (Pinus mugo Turra) is a native of the mountainous regions of Europe. It has a dwarf, spreading form.

Leaves are dark yellow-green, usually not twisted, 1-3 inches long and in clusters of 2. Cones are 1-2 inches long. It is planted for ornament and on dry, gravelly slopes, for roadside beautification.

EASTERN WHITE PINE *Pinus strobus* L.

The abundance and value of eastern white pine in Maine has caused it to be known as the Pine Tree State. The designation has also resulted from Legislative action. Title 1 MRSA Sec. 211 originated with Resolves 1895 Chap. 3, approved Feb. 1, 1895, which stated "Resolved, That the Pine Cone and Tassel is hereby declared to be the floral emblem for Maine, in the National Garland of flowers." Title 1 MRSA Sec. 208 originated with Resolves 1945 Chap. 8, effective July 21, 1945, which stated "Resolved: That the white pine tree be, and hereby is, designated the official tree of the State of Maine."

The availability and high quality of white pine lumber played an important part in the development and economy of Maine since 1605, when Captain George Weymouth of the British Royal Navy collected samples here and brought them back to England for display. Shortage of shipmasts in Europe led to England's Broad Arrow Policy in 1691, whereby pines 24 inches or more in diameter within 3 miles of water were blazed with the "mark of the broad arrow"; such trees



EASTERN WHITE PINE

Embryo to Mature Cones. One-half natural size.
From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin Company.

to be reserved for use in the Royal Navy. The term "King's Pine" originated from this policy. Most of the accessible virgin pine was cut by 1850. Lumber production reached its peak in 1909 but white pine is still the principal lumber

species and continues to contribute greatly to the economy of the state.

White pine occurs in all localities in the state in moist situations, on uplands, and on sandy soil, but develops best on fertile, well-drained soils. On sandy soil it often becomes established in pure, or nearly pure forests or groves. It is the major species planted in the state.

The tree grows rapidly both in height and diameter, making an average height growth of one foot each year.

When growing in the open, the young tree is symmetrical and conical in outline. In the forest it has a narrow head, and the trunk is commonly free of branches for a considerable portion of its length. Old forest trees have a broad and somewhat irregular head. The branches are horizontal, and in regular whorls, usually of 5 each. Very old trees often become very irregular and picturesque. The trunk tapers gradually, and the tree often attains a height of 100 feet. Commonly it is from 70-80 feet tall, and has a diameter of 1-3 feet.

The bark of young trees is smooth and thin, green with a reddish brown tinge over-all, or brown in spots. On old trees, it is from 1-2 inches thick, very dark, and divided into broad, flat ridges by shallow fissures.

Leaves are in clusters of 5, flexible, from 3-5 inches long, bluish green but whitish on one side. The papery sheath at the base of the new needle clusters falls in late August.

The cones are 4-8 inches long, cylindrical and borne on a long stalk. They take 2 years to mature and open to discharge the seed shortly after ripening in late August through September of the second season.

The wood is light in color, and durable except when in contact with the soil. It is soft, not heavy, and is easily worked. The wood is used for light and medium building construction, for cabinet making, sash and door manufacture, pattern making, furniture, box boards, interior and exterior finish, boat planking, pulp, and wood flour.

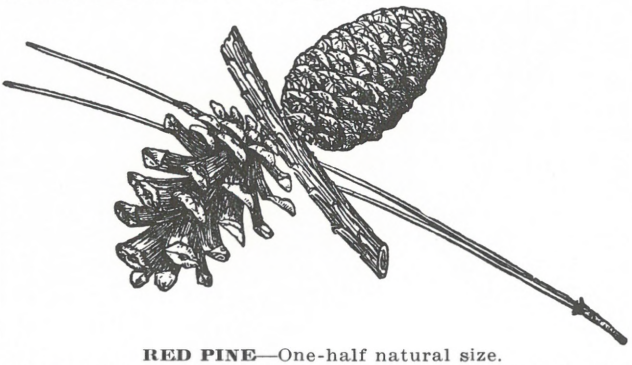
RED PINE (Norway Pine) *Pinus resinosa* Ait.

Red pine, though common, is found only locally throughout the state, growing on dry, rocky ridges, or light, sandy soil. Groves are usually scattered through forests of other species. The beautiful "Cathedral Pines" occur near Eustis.

The young trees have the branches extending to the ground and form a conical outline. Later, the head is rounded and picturesque. Branches are generally horizontal. It attains a height of 60-80 feet, and a diameter of 2-3 feet. The trunk is straight and tapers slowly. Red pine is intolerant to shade.

The bark is divided into broad, flat ridges by shallow fissures.

The leaves are arranged in clusters of 2, and are 4-6 inches long, dark green, soft and flexible. They break cleanly, at a sharp angle, when doubled between the fingers.



RED PINE—One-half natural size.
From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin Company.

The cones are much like an egg in shape, about 2 inches long, and borne on short stalks. The base of fallen cones is hollow. They mature in the fall of the second season and usually remain on the branches until the following summer. Cones may be collected for seeds from September throughout the fall and winter, due to their gradual release of seed.

The wood is a little heavier and harder than white pine, close grained, hard and fairly strong. It is used for poles, piles, building construction, and pulp.

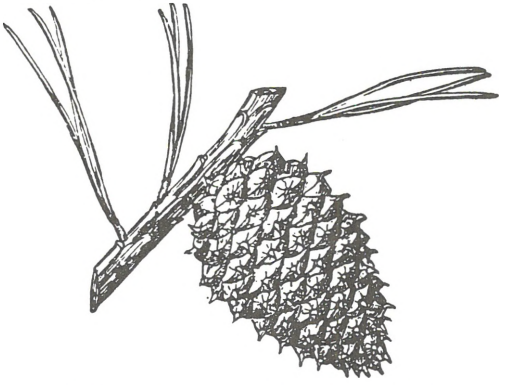
Owing to the reddish bark, and the pale red heart wood, the name "red pine" is appropriate. The name "Norway pine" refers to its original finding near Norway, Maine. Since it infers that the tree is foreign in origin, this name should not be encouraged.

PITCH PINE *Pinus rigida* Mill.

Pitch pine grows on sandy barrens or plains, and on gravelly soil of the uplands. It is quite common in the southern part of the state, on the sand plains near Brunswick and Oxford, and on Mt. Desert Island.

Branches are horizontal, rigid, contorted, and form an open crown. Pitch pine attains a diameter of 1-2 feet, and a height of only 30-40 feet. The trunk tapers rapidly and generally is straight. Often the tree produces cones when small. It is the only native pine that will produce "sprout" growth when apparently killed by such factors as fire.

The bark is rough, even on young stems and branches. On old trees, it is irregularly divided into continuous broad flat ridges, and is deep gray or reddish brown in color.



PITCH PINE—One-half natural size.

From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin Company.

The leaves are in clusters of 3, and are from 3-5 inches long. They are dark yellow-green, stiff, standing at right angles to the branch.

The cones require 2 years to mature, are 1½-3½ inches long, borne on short stalks, hardly noticeable, and are often produced in clusters. A sharp, rigid curved prickle is produced on the tip of each scale. The cones open gradually during mid-winter. Seeds are released over a period of several years. Cones often remain on the trees 10-12 years.

The wood is moderately heavy, strong, hard and stiff. It is used for construction lumber, box boards, and pulp.

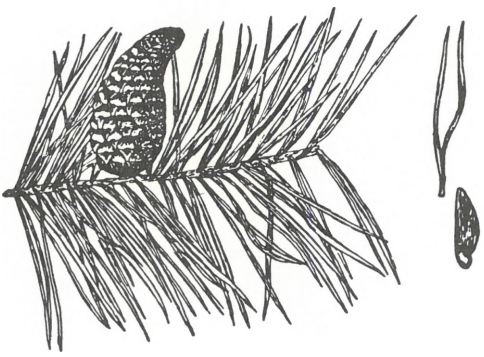
At one time considerable quantities of tar and turpentine were obtained from this tree.

JACK PINE (Gray Pine) *Pinus banksiana* Lamb.

Jack pine grows on sandy, rocky, shallow acid soils. It is known to occur naturally at Alamoosook Lake, Schoodic Point, Great Wass Island, Matagamon Lake, Cliff Lake, Lobster Lake, and in the junction-area of Upper Enchanted, Hobbstown and T. 5 R. 7.

The spreading branches are long and flexible and form an open head of symmetrical outline. At maturity the tree is about 50-60 feet tall, and 8-10 inches in diameter. Cones are often produced when the trees are only a few years old.

The bark is thin with irregular rounded ridges. It is dark brown in color, with a slight tinge of red.



JACK PINE

Leaves, Cone and Seed.

The leaves are in clusters of 2, and are ¾-1½ inches long. They are stout, yellow-green at first, dark green later, rather flat, and twisted at the base.

The cones require 2 years to mature, are rather slender, 1½-2 inches long, and without a stalk. They are very much curved. The scales have minute prickles which are often deciduous. The cones usually remain closed for several years, and often do not fall for 12-15 years.

The wood is moderately hard, heavy, and close-grained. It is used in light and medium building construction, box boards, posts, poles and pulp.

TAMARACK (Eastern Larch, Hackmatack)
Larix laricina (Du Roi) K. Koch

Tamarack is most commonly found in cool, swampy places although it also grows on well drained soil. It is found in practically every part of the state.

In the forest, the tree grows to a height of 50-60 feet and a diameter of 20 inches. It has a regular, narrow, pyramidal head with small, stiff and horizontal branches.

In northern Maine, the name "juniper" is quite commonly applied to this tree, but since juniper is the true name of another tree its use for tamarack should be discouraged.

The bark separates on the surface into small, thin, irregular scales of a reddish brown color.

TAMARACK
Twig and Cone. One-half natural size.

The leaves are linear, about one inch long, triangular in cross section, and borne in clusters of 8 or more on spurs, but leaves on elongating new shoots occur singly. They are bright green and turn yellow in September just before they fall. It is our only conifer that sheds all its leaves every fall.

The cones are small, nearly spherical, about ¾ inch long, light brown, and borne erect on stout stems. They open in the fall to liberate the small winged seeds and usually remain on the tree until the following year.

The wood is rather coarse-grained, hard, heavy, strong, and with a durable heartwood. It is used for planking, timbers, ties, vats and tanks, poles, piling, and pulp.

SPRUCES

The Important Distinctions

BLACK SPRUCE	RED SPRUCE	WHITE SPRUCE
Picea mariana (Mill.) B.S.P.	Picea rubens Sarg.	Picea glauca (Moench) Voss
Leaves	**Leaves**	**Leaves**
Blue-green; dull with bloom; ¼-½ inch long.	Dark yellow-green; very shiny; ½-⅝ inch long.	Blue-green to dark green; dull ⅓-¾ inch long; pungent odor when crushed.
Cones	**Cones**	**Cones**
½-1½ inches long. Cone scales stiff and rigid when ripe; scale margin irregularly notched. Cones nearly spherical when open. Usually remain on tree many years.	1¼-2 inches long; widest in the middle; scales stiff, with margin entire or slightly notched. Generally fall the first year.	About 2 inches long; cylindrical. Cone scales flexible at maturity, margin entire. Usually fall the first year.
Twigs	**Twigs**	**Twigs**
Yellow-brown to brown, with short rusty to black hairs. Some hairs tipped with globose glands.	Reddish to orange-brown, with short rusty to black hairs. Hair tips lack glands.	Light gray to yellowish brown, without hairs.

Seed of all spruces is winged. Cones are pendent. Bare twigs are roughened by persistent leaf bases.

Norway Spruce (Picea abies (L.) Karst.) is a native of Europe, and is of great economic importance in its natural range. Here it is commonly planted both in forest plantations and as an ornamental tree. Norway spruce is one of four species of conifers presently being raised at the State Forest Nursery at Greenbush for planting stock. It rarely escapes.

It is very symmetrical and graceful in its growth habit, open grown trees often carrying branches clear to the ground. The tips of branches on larger trees have an upward sweep and lateral branchlets are long and pendent. Twigs are without hairs.

Norway Spruce is a more rapid grower than any of our native species of spruce, and is a species frequently planted for pulpwood. It is occasionally used for lumber and as an ornamental.

The leaves are about one inch long, sharp-pointed, glossy and dark green in color. The needles lack the tendency to bend upward on the twigs as in white spruce.

Cones are cylindrical, 4-7 inches long with stiff, notched scales. They ripen from September to November but may be collected from September to April.

Blue Spruce (Picea pungens Engelm.) is a native of the Rocky Mountain region, and is frequently planted in the East as a decorative tree. Foliage coloration varies from silvery-blue to blue-green; the intensity of blue varying between individual specimens. The leaves are about one inch long, stiff, very sharp-pointed, and strongly incurved. Cones are oblong, 2½-4 inches long, with thin, flexible, notched scales.

Selected specimens are usually planted singly, on lawns or in landscape effects, where the color of the foliage and the shape of the tree are of primary importance. Blue spruce will grow on a variety of sites and tolerates a wide range of growing conditions. These factors contribute to its popularity as a favored ornamental species.

BLACK SPRUCE *Picea mariana* (Mill.) B. S. P.

Black spruce occurs on cool upland soils, but is more commonly found along streams, on the borders of swamps and in sphagnum bogs. It grows to a height of 70 feet and a diameter of 6-12 inches. In sphagnum bogs, trees 50-80 years old may be only 6-8 feet tall and about one inch in diameter.

The branches are short, pendulous, and have a tendency to curve up at the ends. It forms an open, irregular crown. The lower branches often touch the ground and form new trees by the natural layering method.

The bark on the trunk is grayish brown and the surface is broken into thin scales.

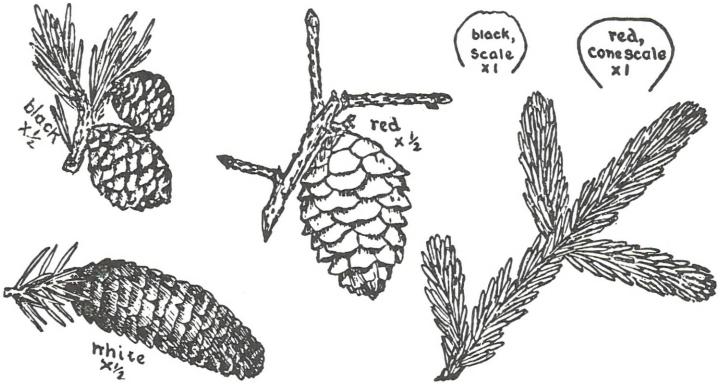
The leaves are ¼-½ inch long, dull blue-green in color, blunt-pointed, flexible, and soft to the touch.

The cones are ½-1½ inches long, ovoid, and become nearly spherical when open. The cone scales are stiff, and have toothed margins. The cones usually stay on the trees for many years.

The twigs have many hairs, some of which are tipped with glands. The inner bark is olive-green.

The wood is soft and light, but strong. It is used for the manufacture of pulp, for construction lumber, piling and for Christmas trees.

Spruce beer is made by boiling the branches. The tree is often scarred for spruce gum.



SPRUCES
Twigs, cones and cone-scales.

RED SPRUCE *Picea rubens* Sarg.

Red spruce is found commonly in all parts of the state. It grows on well-drained, rocky upland soils, and particularly on the north side of mountain slopes, where it may be the major species present.

The spreading branches form a somewhat conical, narrow head in young trees. The trunk is long, with a slight taper. It grows to considerable size, and is capable of attaining a height of 60-80 feet and a diameter of 1-2 feet, but occasionally exceeds these measurements. Red spruce is shade tolerant and will become established in the understory of mixed stands.

The bark on mature trees is thick and is broken into thin, reddish brown scales of irregular shape.

The leaves are dark green often with a yellow tinge and are very shiny. They are about ½ inch long, sharp-pointed, stiff, and prickly to the touch.

The cones are oblong in shape and usually from 1½-2 inches long. When ripe, they have a reddish brown color and are quite shiny. The cone scales are stiff like the black spruce, but the margins are generally without conspicuous notches. The cones begin to drop in the autumn or early winter and are all gone from the branches by the next summer.

The twigs have hairs none of which have a gland at the tip as in black spruce. The inner bark is reddish brown.

The wood is fairly soft, light, close-grained, and strong, but is not as durable as pine when exposed to the weather.

Red spruce is one of our most valuable trees for the production of building lumber. It is used for joists, sills, scantlings and heavy construction timbers, and is the principal wood used in the manufacture of paper pulp. It is also used for weir poles, piling, and Christmas trees, and is valuable for the sounding boards of musical instruments. Spruce gum is obtained largely from this tree.

WHITE SPRUCE *Picea glauca* (Moench) Voss

White spruce, sometimes called "cat" spruce, is a widely distributed species in Maine, but is not as abundant as the red spruce. It grows on shallow, rocky sites from the coast to the tree line in the mountains, and is also commonly found in old pastures, or cleared land. It is unable to tolerate shade and will not grow as an understory tree.

The long and rather thick branches, densely clothed with stout, rigid lateral branches, are curved upward, and form a somewhat open, irregular head, having a broad base. It commonly grows to a height of 60-90 feet, and a diameter of 2 feet.

The bark on old trees has light grey, plate-like scales which are thin, irregular, and with a somewhat brownish surface, light grey and smooth on younger trees.

The leaves on the lower side of the branches are often bent upward in such a manner as to bring them all on the upper side. They are pale blue-green at first, later becoming a dark blue-green. The foliage emits a peculiar and characteristic odor which offers a ready means of distinguishing it from the other species and is the reason for the alternate name.

The cones are slender, cylindrical in shape, pale brown and shiny when ripe, and usually about 2 inches long. They ripen in August and September, and may be collected for seed up to October. They usually fall off the first year. The cone scales are thin and flexible so that they give easily when the cone is clasped in the hand.

The twigs are without hairs. The inner bark is silvery and glistens.

The wood is fairly light, soft, finishes well, and is moderately strong. It is used for pulp, boxes, paddles, oars, piano sounding boards, lumber, and in limited amounts for Christmas trees.

White and black spruce produce long, tough, pliable roots which were used by the Indians for tying together pieces of birch bark for canoes, and for various other purposes.

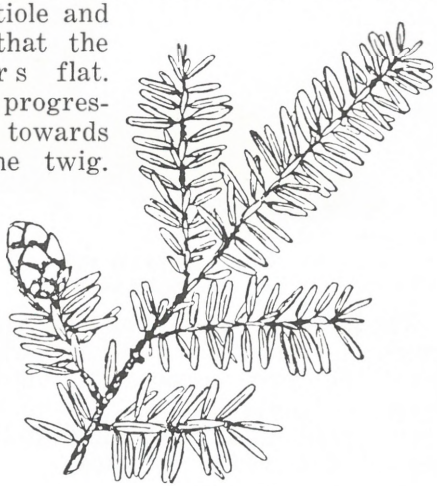
EASTERN HEMLOCK *Tsuga canadensis* (L.) Carr.

Eastern hemlock is found in nearly every part of the state. Best growth is attained on moist, cool sites. It generally attains a height of 60-70 feet, and a diameter of 2-3 feet.

The terminal shoot is pendulous and bends away from the prevailing winds, quite often toward the east. The trunk usually tapers rapidly from the base. This species can withstand considerable shading.

The bark is divided into narrow, rounded ridges covered with thick scales, and varies in color from cinnamon-red to gray. Bark exposed by cuts or bruises shows a purplish tinge.

The leaves are flat, tapering, generally rounded at the apex, from 1/3-2/3 inch long, with a distinct short petiole and so arranged that the twig appears flat. Leaves become progressively shorter towards the tip of the twig. They are dark yellow-green in color with a lustrous upper surface, and a whitish under surface.



HEMLOCK
Spray and cone. One-half natural size.

The cones are about ¾ inch in length, oblong in shape, light brown, pendant, and suspended on short, slender stalks. Cones mature during the first autumn and generally remain on the branches until the next spring. Seeds are winged and fall during the winter.

The twigs are very fine, limber, and are not pitchy.

The wood is coarse, cross-grained, brittle, light, strong, difficult to work, and is likely to be "shaky." It is used for framing, sheathing, roof boards, timbers, and pulp.

The bark once was valuable for tanning but has been replaced by chemicals.

BALSAM FIR *Abies balsamea* (L.) Mill.

Balsam fir is the most abundant conifer in the state. It is frequent in damp woods, and on well-drained hillsides, often occurring in thickets. The tree normally forms a sharp spire to a height of 60-70 feet and grows to 12-20 inches in diameter.

On young trees the branches are horizontal, slender, and produced in regular whorls to form a strikingly symmetrical crown. In old age, the top is often slim, regular and spire-like.

The bark on young trees is pale gray, smooth, thin, and has prominent blisters which are filled with a resinous liquid known as "Canada balsam". On old trees the bark gets slightly rougher.

BALSAM FIR
Branchlet and cone.

The leaves are about one inch long, pitchy, dark green and shiny above, silvery white below, and with the tips occasionally notched. On top branches leaves turn up, but on lower branches they spread out at right angles to the branch, giving it a flattened appearance.

The cones are 2-4 inches long, erect and dark purple in color before maturity. Cones ripen in August and September of the first year, disintegrate shortly thereafter, leaving only the central spike-like stalks.

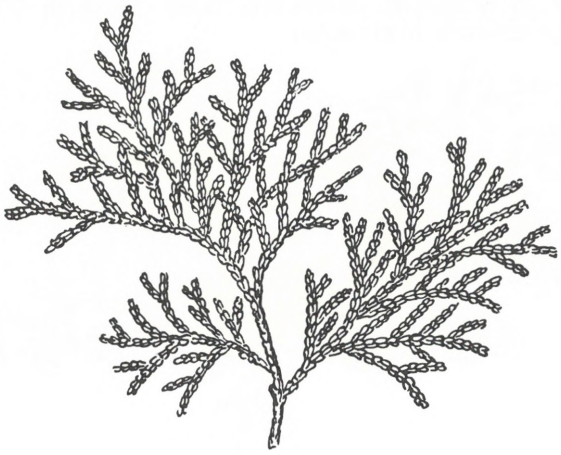
The twigs are smooth after the leaves have shed. Winter buds are covered with clear resin.

The wood is soft, light, and moderately limber. It is sawed into lumber chiefly for light and medium building construction and is used in a large degree for pulp. Owing to the fact that the wood imparts no flavor or odor, it is used for the manufacture of butter firkins.

Balsam fir is favored for Christmas trees and greens. Small trees are cut in great numbers for the northeastern Christmas tree market.

ATLANTIC WHITE-CEDAR *Chamaecyparis thyoides* (L.) B. S. P.

Atlantic or coast white-cedar is found in quaking bogs or low areas along ponds or streams at Newbert Pond in Appleton, Knight Pond in Northport, and from Cape Elizabeth south through York County. In Maine it rarely reaches a height of over 40 feet. The short branches come out from a gradually tapering trunk, giving the tree a conical appearance. The twigs are only slightly flattened.



ATLANTIC WHITE-CEDAR
One-half natural size.

The bark is fibrous, grayish to reddish brown, usually somewhat spirally twisted and on young trees is easily pulled off in strips.

The leaves are bluish-green, scale-like, and arranged in somewhat fan-shaped clusters. When crushed, they give off an aromatic odor.

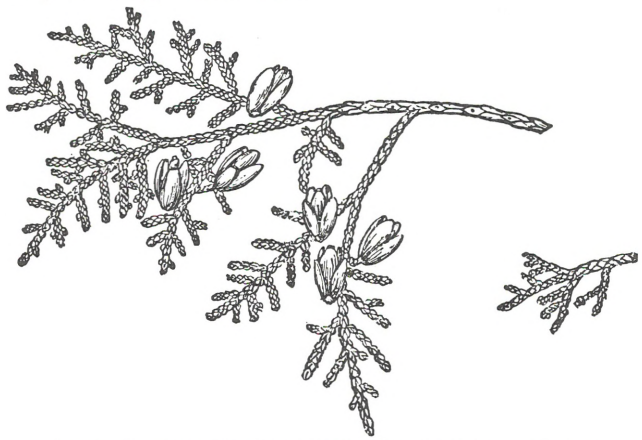
The cones are small, round, smooth and purplish in color before maturity, about ¼ inch in diameter with tack-like scales. They persist through the winter, but are very inconspicuous.

The wood is light, close-grained, strongly fragrant, and light brown in color tinged with red. It is used largely in boat building, cooperage, shingles, posts, rustic fencing, and ties. This species is preferred over redcedar for dog bedding because of its softer properties and stronger aroma.

NORTHERN WHITE-CEDAR (Eastern Arborvitae) *Thuja occidentalis* L.

Northern white-cedar is generally found in swamps, along streams, mountain slopes and old pastures where the soil is moist. Dense stands are widely distributed in the state. It is most abundant in the northern and eastern sections, and grows best on alkaline soils. It is widely used as an ornamental.

The head is compact, narrow and pyramidal in shape. The branches are horizontal, short and turned upward. Trees grow to 60 feet in height and to 3 feet in diameter. The trunk is often very strongly buttressed.



NORTHERN WHITE-CEDAR—One-half natural size. From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin Company.

The bark has shallow fissures, which divide it into flat narrow ridges. It is reddish brown in color, tinged very often with orange.

The leaves are opposite or two-ranked, usually only about 1/8 inch long, scale-like, blunt, and so arranged as to make the small branches flat in shape. They have a pleasant, aromatic odor, and a rather pleasing taste.

The cones are erect, small, about ½ inch long, with only a few pairs of scales. They mature in one season. The seed is small and winged.

The wood is soft and light, coarse-grained, brittle, has very durable heartwood and a fragrant odor. It is used for railroad ties, shingles, slack cooperage, poles, posts, rustic fencing, and is occasionally sawed into lumber for boxes, crates, siding, and boats.

EASTERN REDCEDAR *Juniperus virginiana* L.

Eastern redcedar is not a common species in this state. It grows on poor soils, gravelly slopes, rocky ridges, and on moist, sandy ground. It is found scatteringly in southern Maine and locally in Bridgton, Porter, Denmark, and West Gardiner. It gets the name "redcedar" from the red color of the heartwood.

It is very variable in its habit. Young trees have slender horizontal branches, and a narrow, compact, conical head. The crown of old trees becomes broad and much rounded. In this state, trees attain a diameter of 8-12 inches, and a height of 30 feet.

The bark on the trunk is light brown, tinged with red, and separating into long, narrow shreds on old trees.

The leaves are scale-like, overlapping, about 1/16 inch long, dark green, and remain on the tree

EASTERN REDCEDAR
Two-thirds natural size.

5-6 years, growing hard and woody the third season. Branchlets appear square in cross section. Current growth and vigorous shoots contain sharp-pointed, awl-shaped leaves; the so-called "juvenile" growth.

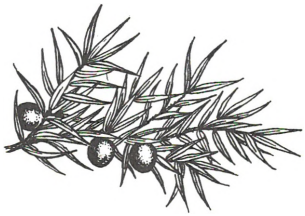
The fruit is berry-like, globose, 1-2 seeded, pale green at first, dark blue when ripe, and is about the size of a pea.

The wood is brittle, fine-grained, light, easily worked and durable. The heartwood has a dull red color. It is valuable for pencils, fence posts, pails, and cabinet making, but in this state it is not sufficiently plentiful to be of commercial importance.

COMMON JUNIPER *Juniperus communis* L.

Common juniper is found primarily as a shrub in pastures and waste open places such as on shallow, rocky soil. It occurs infrequently and locally in south and central Maine, and is found occasionally as a tree. Specimens up to 25 feet in height have been recorded but are extremely rare.

The bark is grayish brown in color and occurs in thin, longitudinal, shreddy layers. The inner portion has a reddish tinge.



COMMON JUNIPER

Leaves and fruit.
One-half natural size.

The leaves occur in whorls of 3. They are sharp, stiff, dagger-like, and persist for several seasons. They are from ¼-¾ inch in length. The upper surface is concave and marked with a broad, white line. The underside, which, due to the bending of the twigs usually appears uppermost, is dark green. The leaves persist for several seasons.

The fruit is dark blue, covered with a thin bloom, is slightly smaller than a pea, has a strong resinous taste, and remains on the trees during the winter. It is usually only found on some of the trees, since male and female flowers are generally produced on separate trees, as with other junipers.

The wood is hard, close-grained, and very durable. The heartwood is light brown.

Oldfield, Common or Ground Juniper (Juniperus communis var. **depressa** Pursh.) is the prostrate form common in pastures and poor sandy, gravelly, rocky soils.

WILLOWS

Maine has many willows, but this is a large and difficult group which can be handled only by specialists. The Revised Check-List of the Vascular Plants of Maine, 1966 (see References, p. 86), shows 58 native and exotic species, varieties, and hybrids to be present in the State.

All willows have the following characteristics in common: **Buds** are covered with a single, cap-like scale with silky, gray hairs beneath the scale. **Leaves** are alternate, mostly narrow, and the petioles are short or lacking. **Flowers** occur in catkins. **Fruits** consist of small, usually 2-valved capsules filled with silky hairs which are attached to the seeds.

BLACK WILLOW *Salix nigra* Marsh.

Black willow occurs throughout the State, but may be rare or absent in Aroostook, Piscataquis and Washington Counties. It grows to a height of 10-65 feet, and is found near streams and ponds. The stout, upright, spreading branches give the tree a broad, irregular outline. It is probably our largest native willow. The bark on old trees is shaggy and dark brown. The very narrow, sometimes sickle-shaped, finely-toothed leaves are 3-6 inches long. The wood is soft, light, weak, and is used occasionally for farm lumber.

BLACK WILLOW

POPLARS — ASPENS

The Important Distinctions

QUAKING ASPEN Populus tremuloides Michx.	BIGTOOTH ASPEN Populus grandidentata Michx.	BALSAM POPLAR Populus balsamifera L.
Bark Often with horizontal bands of circular wart-like outgrowths. Very bitter. Light or grayish green, and smooth in young trees.	**Bark** Smooth in young trees; not bitter. Darker or olive green.	**Bark** Smooth or roughened by dark excrescences, reddish brown on young trees.
Leaves Circular outline. Edges finely toothed; shiny upper surface. 1½-3 inches long. Not rusty beneath. Petiole flattened.	**Leaves** Broadly egg-shaped in outline, edges irregularly and coarsely toothed. Upper surface not shiny. 3-4 inches long. Not rusty beneath. Petiole flattened.	**Leaves** Egg-shaped in outline, but narrower than large tooth aspen. Edges finely toothed. Upper surface shiny; lower rusty. 3-5 inches long. Petiole rounded.
Winter Buds Slightly sticky, shiny, conical. Not fragrant. No hairs on scales.	**Winter Buds** Not sticky; edges of bud scales fringed with whitish hairs. Broadly egg-shaped. Not fragrant.	**Winter Buds** Very sticky; sweet odor; egg-shaped; shiny.

Poplar twigs have a pith that is star-shaped in cross section.

The poplars belong to the willow family and resemble willows in flower and fruit characters. The nodding, "woolly bear" caterpillar-like staminate and pistillate catkins are borne upon different trees. They open before the leaves are out, and are conspicuous in the early spring. Poplars, like willows, have a transcontinental range, and can be propagated very easily from cuttings.

White-barked Quaking Aspen (P. tremuloides var. magnifica Vict.). Primarily in Northern Maine and much like quaking aspen, but with white (ash-gray) bark. Bark may look like white birch from a distance, but does not peel off.

White (Silver) Poplar (P. alba L.) is an introduced species planted to some extent. It is easily recognized by its rhomboid leaves which are green above and white, felt-like beneath.

Eastern Cottonwood (P. deltoides Bartr.) has been commonly planted as a street and yard tree but is native further west and south. Leaves are somewhat similar to bigtooth aspen but are much more triangular in outline and are shiny.

Lombardy Poplar (P. nigra var. italica Muenchh.) is a native of Europe and is easily recognized by its narrow, spire-like form. It has been planted commonly but often after a varying number of years dies back due to disease.

Balm-of-Gilead Poplar (P. balsamifera var. subcordata Hylander). Probably not native. Somewhat more spreading than the balsam poplar, but with leaves ovate and with base of leaf margin heartshaped. It produces only pistillate flowers, so propagation is only by cuttings or root sprouts. Also has fragrant buds like the balsam poplar.

QUAKING ASPEN (Popple, Trembling Aspen)

Populus tremuloides Michx.

Quaking aspen is an abundant, rapid growing tree ocurring in either pure stands or in mixture with other species. It is found on many different kinds of soil, but makes the best growth on sandy, moist soils. Frequently it is the first species, with paper birch, to become established following heavy cuttings or burns. It does not persist in dense woods because it is intolerant of shade.

It is a graceful tree with slender branches far apart and often contorted. Head round and narrow. It grows to a height of 60-75 feet and a diameter of 10-16 inches.

The bark is smooth, often roughened by horizontal lines of wartlike outgrowths. It is a pale green with dark brown patches. Bark of old trees is ash gray, dark at the base where it is divided into broad, flat ridges. It has a very bitter taste similar to quinine.

QUAKING ASPEN
Leaves and flowers; 1 staminate, 2 pistillate.
One-third natural size.

The leaves are alternate, rounded, short-pointed, with finely rounded teeth; dark green and shiny above, 1½-3 inches long. The flattened petiole causes the leaves to tremble in a breeze.

The flowers are in catkins which appear before the leaves.

The fruit is a capsule which ripens about June. The seeds are very small, light and cottony, and are carried long distances by the wind.

The buds are dark brown, have a varnished appearance, and may be slightly sticky. Flower buds are usually larger than the leaf buds.

The wood is close-grained, soft, and rots very easily. It is used for lumber, box boards, pallets, excelsior, and for the manufacture of pulp, plywood, core stock, and expendable turnery items.

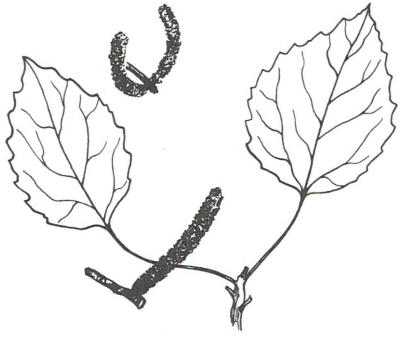
BIGTOOTH ASPEN (Poplar, Popple)
Populus grandidentata Michx.

Bigtooth aspen is very common in mixture with the quaking aspen and, like it, is a rapid grower in various soils and in different situations, but making best development in a rich sandy and fairly moist soil. It is more shade tolerant and therefore more competitive than quaking aspen and grows with other species either scattered or in small groves.

It attains a height of 60-80 feet and a diameter of 10-20 inches.

The bark is smooth, olive to gray-green in color. At the base of old trees, it is dark and divided into broad, irregular, flat ridges.

The leaves are alternate, 3-4 inches long, broadly egg-shaped in outline, and have a dark green upper surface. The edges are coarsely and irregularly toothed. The petiole, or leaf stalk, is flat.



BIGTOOTH ASPEN

Leaves and flowers; pistillate above, staminate below. One-third natural size.

The flowers are in catkins, and appear before the leaves.

The fruit ripens in May about the time the leaves begin to come out. The seeds are small and light and are carried long distances by the wind.

The buds are dull gray, slightly hairy, and not sticky.

The wood is like that of the preceding species and is used for the same purposes.

BALSAM POPLAR *Populus balsamifera* L.

Balsam poplar inhabits the borders of swamps and the low bottom lands along rivers throughout the state except in York County. It gets its name from the fragrance of the resinous, sticky buds.

In habit, the tree is somewhat different from the two preceding. The branches are stout, erect, more or less contorted at the ends, and form an open, rather narrow head. It reaches a height of 30-70 feet, and a diameter of 15-30 inches.

The bark on young trees is smooth, or sometimes roughened by dark outgrowths and is greenish to reddish-brown. On the trunk of old trees, it is gray and separated into broad, rough ridges.

BALSAM POPLAR

Leaves and fruit.

The leaves are alternate, ovate, 3-5 inches long, and 2-3 inches wide. They are deep dark green and shiny on the upper surface, light green and usually with rusty blotches on the under side. The edges are lined closely with small, rounded teeth. The petioles are round in cross section.

The flowers are in catkins which appear early in the spring just before the leaves.

The fruit ripens the last of May or early in June. Each seed is attached to a cottony mass so that it is often carried long distances by the wind.

The wood is like that of the other poplars, and is used for the same purposes.

BUTTERNUT *Juglans cinerea* L.

Butternut occurs naturally to some extent or in cultivation over most of the state. It grows on rich, moist soil and on rocky hills, especially along fence rows.

It frequently has stout, spreading limbs, extending horizontally from the trunk to form a low, broad, rounded head. It is a tree 30-40 feet high and has a diameter of 1-2 feet.

The bark of young trees and of the branches is gray. On old trees, it is broadly ridged on the trunk and of a light brown color.

The leaves are compound, alternate, 15-30 inches long, and consist of 11-17 leaflets. Margin of leaflets is serrate.

The fruit is composed of a nut enclosed by a fleshy husk covered with sticky hairs. It is about 2½ inches long and ellipsoid in shape. Fruit is produced in drooping clusters of 3-5. The nut is thick-shelled with sharp ridges on the surface. Indians used the oil from the nuts for making butter.

BUTTERNUT
Winter twig.
One-half
natural size.

BUTTERNUT
Leaf and fruit. Fruit one-third natural size.

The twigs are stout, greenish and hairy, with chocolate-brown, chambered pith. The large leaf scars have a conspicuous, buff-colored, hairy pad at the top. Buds are also hairy.

The wood is coarse-grained, light, soft, and weak. It is sometimes used for furniture and cabinet work, and takes a high polish.

Black Walnut (J. nigra L.), **Japanese Walnut** (J. sieboldiana Maxim.), and **Japanese Heart-nut** (J. sieboldiana var. cordiformis (Maxim.) Mak.) are planted occasionally. The last two have escaped readily at Brunswick and are hardy.

SHAGBARK HICKORY *Carya ovata* (Mill.) K. Koch

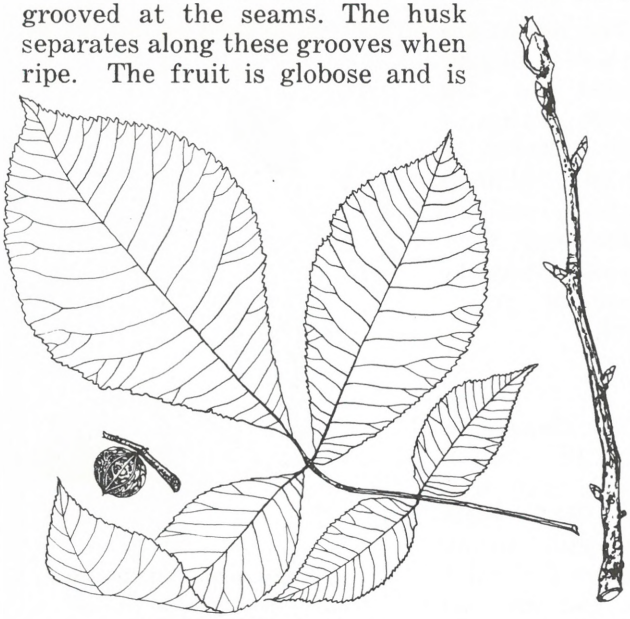
Shagbark hickory occurs locally in southern Maine on moist, but well-drained soil.

It has a cylindrical head and a straight, gradually tapering trunk. It reaches a height of 70 feet and a diameter of 2 feet.

The bark is light gray on the trunk and separates into long, loose plates, giving it a shaggy appearance.

The leaves are compound, alternate, 8-14 inches long; the leaflets ordinarily 5 in number, rarely 7, with the 3 terminal ones the largest. Margin of leaflets is serrate.

The fruit has the thick outer husk deeply grooved at the seams. The husk separates along these grooves when ripe. The fruit is globose and is



SHAGBARK HICKORY
Leaf and young fruit. One-third natural size.

Winter twig. One-half size.

borne singly or in pairs. The kernel is sweet.

The twigs are hairy or smooth and olive gray to dark red-brown in color. Pith is star-shaped in cross section. Bud scales are hairy.

The wood is very strong, close-grained, heavy, hard, tough and flexible. It was formerly used in the manufacture of agricultural implements, for making carriages and wagons, especially the spokes and rims of the wheels, and for axe and tool handles. Its principal use now is for pallets.

EASTERN HOP-HORNBEAM (Ironwood)

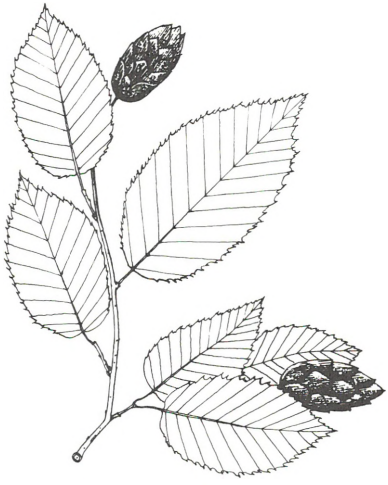
Ostrya virginiana (Mill.) K. Koch

Eastern hop-hornbeam is a small tree with either an open or rounded crown. It reaches a height of 20-30 feet, and a diameter of 6-10 inches. The branches are long and slender, and the ends are somewhat drooping.

It is a fairly rapid grower, especially in good soil. It grows on slopes and ridges having a dry, gravelly soil, and is often found in the shade of other species.

The bark is grey, separates easily into thin, narrow scales, becoming finer and stringy on older trees.

The leaves are either egg-shaped in outline or nearly oblong, widest in the middle, hairy on both surfaces, alternate, sharply toothed, and 2-3 inches long. They are somewhat like those of yellow birch.



EASTERN HOP-HORNBEAM
Leaves and fruit. One-third natural size.

The flowers occur in catkins which open with the leaf buds. The male catkins are pre-formed in the fall and are usually in clusters of 3.

The fruit is bladder-like, encloses a ribbed nutlet, and occurs in clusters. It ripens in September. The name "hop-hornbeam" refers to the fruit which closely resembles the true hops.

The twigs are light brown, fine, tough and wiry, and have a small green pith.

The wood is very close-grained, heavy, very strong, and is exceedingly hard when seasoned. It is used for levers, mallets, tool handles, rollers for heavy equipment, and chopping blocks.

AMERICAN HORNBEAM (Blue-beech)

Carpinus caroliniana Walt.

American hornbeam is a small, slow growing tree 10-25 feet tall and 4-10 inches in diameter. The branches are crooked. The trunk is characteristically ridged, or fluted longitudinally. The hornbeam is found in southern and central Maine, inhabiting wet woods and the borders of swamps and streams.

AMERICAN HORNBEAM
Winter twig.
One-half natural size.

AMERICAN HORNBEAM

Leaves and fruit.
One-third natural size.

The bark is smooth, and of a grayish-blue color.

The leaves are alternate, egg-shaped in outline or oval, 2-3 inches long, sharply toothed, smooth above and hairy below. They turn a brilliant scarlet in the autumn.

The flowers are produced in catkins which open in the spring before the leaves.

The fruit is a ribbed nutlet which is attached to the base of a three-lobed bract, and is borne in open clusters.

The twigs are reddish brown, slender and tough. Buds are reddish brown, slender, and sharp-pointed.

The wood is close-grained, compact, strong, tough and durable. It is used for levers, handles, etc.

BIRCHES

The Important Distinctions

SWEET BIRCH	YELLOW BIRCH	GRAY BIRCH	PAPER BIRCH
Betula lenta L.	Betula alleghaniensis Britton	Betula populifolia Marsh.	Betula papyrifera Marsh.
Bark	**Bark**	**Bark**	**Bark**
Dark to almost black. Smooth on young trees; broken into irregular plates on older trees. Strongly aromatic on young branches.	Bright silvery gray or light orange in color, separating into thin, ribbon-like strips. Aromatic on young branches.	Outer, chalky or grayish white; inner orange color. Does not separate into papery layers.	Outer, cream white and shiny; inner bright orange color. Separates into thin, papery layers.
Leaves	**Leaves**	**Leaves**	**Leaves**
Egg-shaped in outline or nearly so. Edges essentially singly and finely toothed. Base heart-shaped	Egg-shaped in outline or nearly so. Edges coarsely or doubly toothed. Base often unevenly rounded.	Triangular or nearly so in outline. Edges doubly and coarsely toothed. Long pointed tip. Upper surface shiny, sand-papery.	Egg-shaped in outline. Edges generally doubly toothed. Not long pointed at tip, upper surface not shiny, and not sand-papery.
Flowers	**Flowers**	**Flowers**	**Flowers**
3-4 catkins on a shoot; not clustered.	3-4 catkins on a shoot; not clustered.	Catkins singly or in pairs on the shoot.	Catkins in clusters of 3.
Winter Buds	**Winter Buds**	**Winter Buds**	**Winter Buds**
Smooth, long, sharp-pointed, without hairs.	Long and sharp-pointed with hairy scales.	Short and ovoid or globe-like. Red-brown to greenish-brown. Not sticky.	Long and tapering, reddish-brown, and sticky when squeezed.
Twigs	**Twigs**	**Twigs**	**Twigs**
Smooth, reddish-brown with spur shoots and no hairs. Bark has a strong wintergreen taste.	Somewhat hairy greenish or yellowish-brown. Bark has a slight wintergreen taste. With spur shoots.	Very fine, warty but not hairy, wintergreen taste lacking. Without spur shoots.	Hairy, wintergreen taste lacking. With spur shoots.

A number of minor species or varieties of birch occur in Maine.

Mountain Paper Birch (B. papyrifera var. cordifolia (Reg.) Fern.) has been found on Mt. Katahdin, from the point where Avalanche Brook crosses the St. John Trail to a point near the summit on the southeast slope. It is also reported from many other points in Maine, particularly on mountain slopes. The leaves are heart-shaped, abruptly pointed, coarsely doubly serrate. The bark separates into thin layers and is reddish-brown or white.

Dwarf Paper Birch (B. papyrifera var. minor (Tuckerm.) Wats. & Coult.) is found near the summit of Mt. Katahdin.

Blueleaf Birch (B. caerulea-grandis Blanchard) is widely distributed on exposed mountain slopes. Leaves are dull bluish-green above doubly serrate, ovate, long-pointed. Trees reach a considerable height.

Dwarf Birch (B. glandulosa Michx.) is a dwarf species found on Mt. Katahdin.

Low or **Swamp Birch** (B. pumila L.) is another dwarf species. Found infrequently through the central part of the state in open bogs.

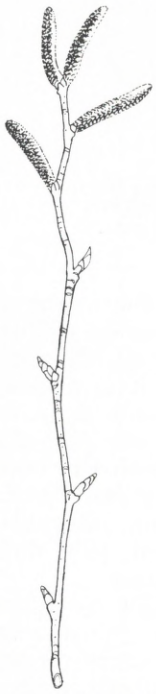
SWEET BIRCH (Black or Cherry Birch)

Betula lenta L.

Sweet birch inhabits the banks of streams, or moist, rich upland soil. It is widely distributed in the southern third of the state, but not common.

It is a rather handsome tree with a tall dark stem, spreading, slender, horizontal branches, pendulous at the ends. It has a graceful, open, narrow head, which in the open becomes round and symmetrical. It grows to a height of 60-70 feet and a diameter of 1-2 feet.

The bark on the trunk of old trees is dark to almost black, and separates into large, thick, irregular plates. On young trees and branches it is smooth, shiny, dark brown tinged with red, aromatic, and has a very pronounced wintergreen flavor.



SWEET BIRCH
Winter twig. One-half natural size.

The leaves are alternate, 3-5 inches long, aromatic, ovate or somewhat oblong, sharply toothed; upper surface dark green, dull; lower surface light yellow-green.

The flowers are produced in catkins. The winter shoots support three to four staminate catkins. They open just before the leaves unfold in the spring.

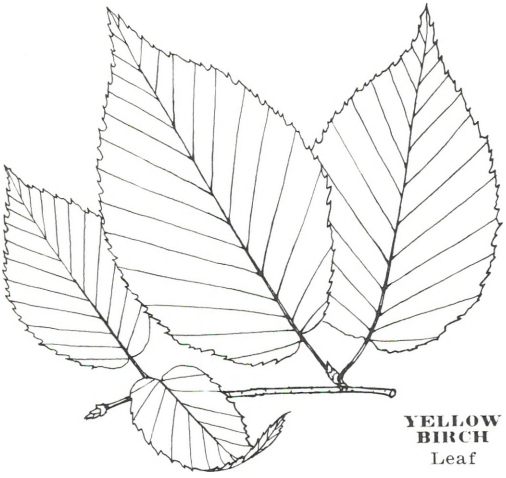
SWEET OR BLACK BIRCH
Leaves and fruit. One-third natural size.

The wood is hard, heavy, strong, and can be beautifully polished. It is very much prized for use in the manufacture of furniture. Limited amounts are used as pulpwood. An oil having some medicinal value can be obtained from the wood by distillation, and is generally known as wintergreen oil.

The name "cherry birch" is applied to this tree because of the resemblance of the bark on old trunks to that of the black cherry.

YELLOW BIRCH *Betula alleghaniensis* Britton

Yellow birch is the largest of the native birches, growing to a diameter of 3 feet and a height of 70-85 feet. The spreading branches are somewhat pendulous, and form a broad, round-topped head in the open, but irregular in the woods. It grows well on cool, moist sites, and is frequently mixed with beech and sugar maple, or with hemlock.



YELLOW BIRCH
Leaf

The bark on the branches and on the stems of young trees is very shiny, silvery gray or yellowish brown in color, separating into loose, thin, often ribbonlike layers. On old trees, it is divided into large thin plates, not shiny, and gray or blackish. The young twigs are aromatic like the black birch but to a lesser degree. Both the buds and twigs have a pronounced wintergreen taste.

The leaves are ovate or nearly oblong, alternate, the edges doubly toothed, the upper side dull, dark green, hairy and 3-4½ inches long.

The flowers are in catkins. In winter there are 3-4 preformed staminate catkins on the shoots, but not in clusters. They open in the early spring.

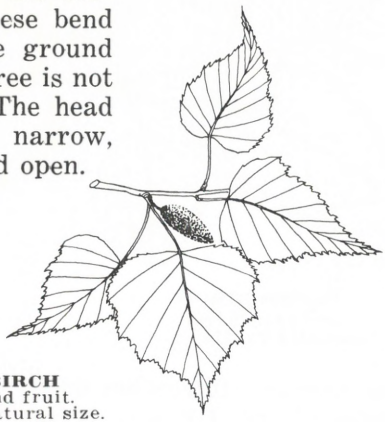
The twigs are yellowish to dark brown, with a wintergreen taste and are somewhat hairy.

The wood is hard, strong, heavy, and will take a good polish. It is close grained, of even texture. The heartwood, which makes up the bulk of the wood, has a very pleasing reddish color. It takes stains easily, makes excellent veneer wood, and does not easily warp. It is also used for furniture, flooring, woodenware, lumber for interior finish, plywood, railroad ties, pallets, pulp, gunstocks, and dowels. The yellow birch is one of our most valuable timber trees.

GRAY BIRCH *Betula populifolia* Marsh.

Gray birch is short-lived and not a valuable tree. It is very abundant in the southern sections of the state, and is frequently found in old fields, burns, and heavily cut areas. This is a small tree which commonly reaches 20-30 feet in height and 4-8 inches in diameter. It often occurs in clumps, and usually leans.

The branches are short, slender, frequently pendulous, and somewhat contorted. These bend toward the ground when the tree is not crowded. The head is long, narrow, pointed and open.



GRAY BIRCH
Leaves and fruit.
One-third natural size.

GRAY BIRCH
Winter twig and buds. One-half natural size.

The bark is close and firm, and does not easily separate into thin layers. The outer part is dull grayish white or chalky; the inner portion is orange.

The leaves are 2½-3 inches in length, thin, long-pointed, triangular, alternate, and doubly toothed. The upper surface is dark green and glossy. The slightest breeze causes them to flutter like those of the poplars, hence the scientific name *Betula populifolia* which means "birch with poplar leaves."

The flowers are produced in catkins. Those which appear in the fall are of the male sex and are usually solitary. They open in early spring before the leaves.

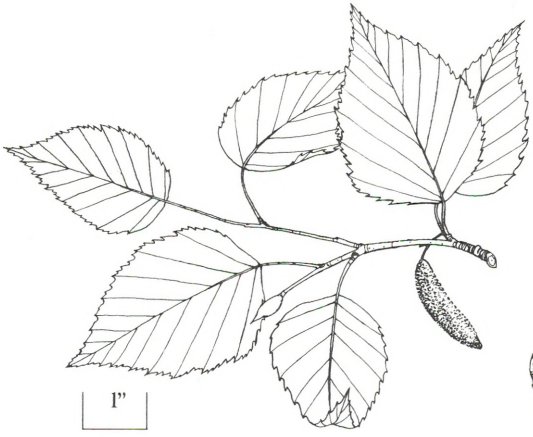
The twigs are the finest of our native hardwoods. They are tough and wiry, dull gray or brown, hairless, and have a rough, warty surface.

The wood is light, soft, often coarse-grained, and decays rapidly when exposed. It is used to some extent for paper-roll plugs, and for pulpwood.

PAPER BIRCH (White or Canoe Birch)

Betula papyrifera Marsh.

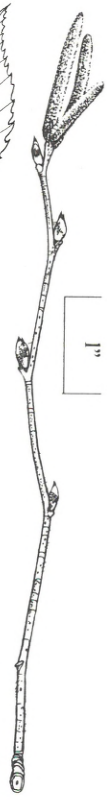
Paper birch is a common tree in all parts of the state, and occurs in pure stands or in mixture



PAPER BIRCH
Leaves and fruit.
One-third natural size.

with other species. It reaches 60-70 feet in height, and 1-2 feet in diameter. It grows along streams and on the borders of lakes and ponds, thriving best in a rich, moist soil.

When young, the branches are short, slender, and spreading, somewhat drooping, and forming a narrow, regular head. In the forest the trunk is free from branches well up from the ground, and the tree forms an open, narrow and round-topped head.



PAPER BIRCH
Winter twig and buds.
One-half natural size.

The bark on the trunk and limbs separates freely and easily into thin, papery sheets. The outer surface is white, the inner part bright orange. Seedlings or very young trees have a darker colored bark, which gradually changes to a creamy-white. The bark is a protective layer and should never be removed from living trees.

The leaves are alternate, ovate, short-pointed, 2-4 inches long, thicker than those of gray birch, doubly-toothed, with the upper surface dark green and dull.

The flowers are in catkins. Those appearing in the fall are dormant, staminate catkins and occur mostly in clusters of 3. They open in early spring before the leaves.

The twigs are usually hairy, and without a wintergreen taste. The buds are slightly sticky.

The wood is close-grained, fairly hard, and strong. It is used for clothespins, woodenware, flatware, turned products, including spools, toys, tooth-picks, dowels, furniture parts, paper-roll plugs; plywood, and for pulp.

This is one of the most valuable tree species in Maine.

The tree gets the name of "paper birch" because of the use to which the bark was put by the early settlers, and that of "canoe birch" because the bark was used by the Indians to make canoes.

Paper birch sap in the early spring contains considerable sugar.

Hybrid Birches: It is known that natural hybrids often occur between certain closely related species of birches, especially between gray and paper birch. The offspring are often intermediate between the parents, or in some cases, resemble one parent much more than the other. In such hybrids, it would require the experience of a specialist in order to determine the exact parentage.

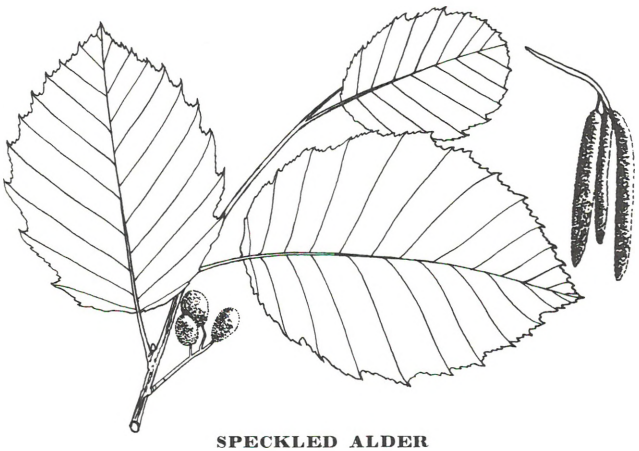
SPECKLED ALDER *Alnus rugosa* (Du Roi) Spreng.

Speckled alder is very common in Maine, usually growing in wet situations along brooks, in swamps, and in pastures. It sprouts very readily and is a nuisance on pasture land.

Alder usually occurs as a shrub, rarely as a small tree. It is seldom more than 4 inches in diameter and 20 feet in height.

The bark is smooth, dark chocolate brown, and marked with white elongated spots called lenticels.

The leaves are alternate, 2-3 inches long, usually broadly ovate, and the texture is rough or rugose as the scientific name implies. The edges are unevenly or doubly toothed.



SPECKLED ALDER

Leaves, flowers and fruit. One-third natural size.

The flowers are in catkins, and open before the leaves in the spring. The purplish, wax-like, male catkins are preformed the previous fall.

The fruit is woody and cone-like, with a very short stalk.

The winter buds are short-stalked, maroon in color, with few scales showing.

The twigs are reddish brown; the pith is triangular in cross section.

The wood is light and soft, and has very little commercial use. The wood discolors very rapidly on exposure to the air.

Two other species, **Downy Green Alder** (A. crispa var. mollis Fern.), and **Hazel Alder** (A. serrulata (Ait.) Willd.) occur as shrubs.

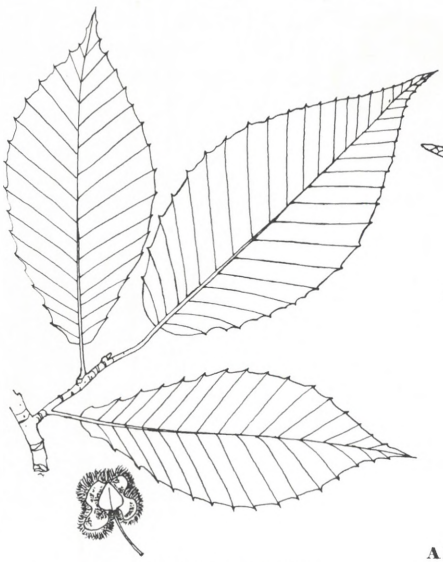
AMERICAN BEECH *Fagus grandifolia* Ehrh.

American beech grows up to 70 feet in height, and 3 feet in diameter. Shoots often spring up from the roots.

Beech is common and sometimes forms nearly pure stands. It grows best on rich upland soil.

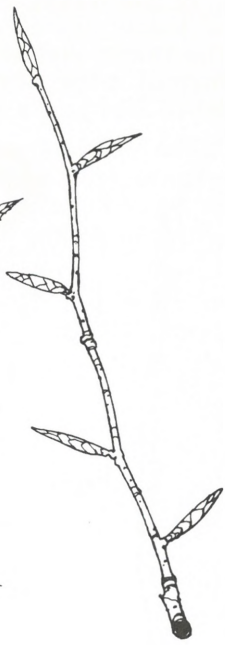
The bark is of a light gray color and smooth.

The leaves are alternate, from 3-5 inches long, elliptic, acutely pointed, with coarse and hooked teeth; and the margin between the teeth nearly straight. Dead leaves tend to remain on trees into the winter.



AMERICAN BEECH

Leaves and fruit.
One-third natural size.



AMERICAN BEECH
Winter twig and buds.
One-half natural size.

The fruit consists of a bur, which usually contains 2 triangular edible nuts. These are sweet and are utilized for food by wildlife.

The winter buds are long, slender, many scaled, and sharp-pointed.

The wood is strong, hard and tough but not durable. It is used for clothespins, furniture, handles, veneer, plywood, woodenware, railroad ties, pulp, dowels, flooring, and pallets.

European Beech (F. sylvatica L.), and **Purple** or **Copper Beech** (F. sylvatica var. atropunicea West.) are two species of European origin planted in southern and central Maine as ornamentals.

AMERICAN CHESTNUT *Castanea dentata* (Marsh.) Borkh.

Most of the chestnut trees in Maine have been destroyed by the chestnut blight fungus, *Endothia parasitica.*

American chestnut now occurs infrequently, usually as sprout growth, in the southern half of the state on rich, well-drained soil. It has been planted occasionally as far north as Bangor. The tree grows rapidly.

In the forest, it had a tall, straight trunk free of limbs, and a small head. When not crowded the trunk divided into three or four limbs and formed a low, broad top. It reached a height of 60-70 feet and a diameter of 15-30 inches.

AMERICAN CHESTNUT
Winter twig and buds. One-half natural size.

AMERICAN CHESTNUT
Leaf and fruit. One-third natural size.

The bark on the trunk of old trees is dark brown and divided into broad, flat ridges by shallow, irregular fissures. On young stems, it is smooth and dark gray with a green tinge.

The leaves are coarsely toothed and hooked, with the leaf margin between the teeth rounded. Leaves are alternate, 5-8 inches long, yellow-green, and smooth on both surfaces.

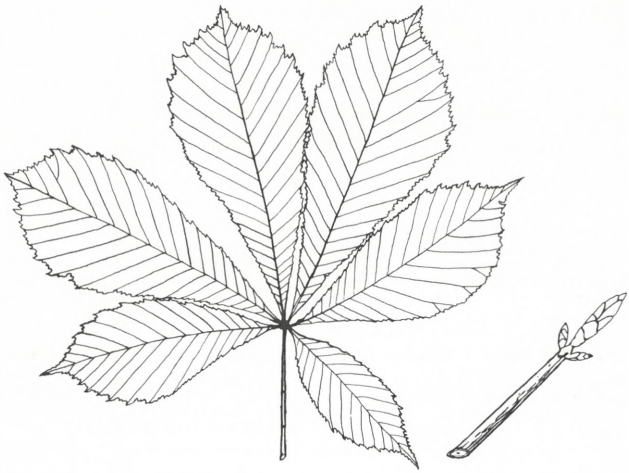
The fruit is a prickly bur, containing 2-3 nuts tipped with hairs. The inner lining of the bur is plush-like.

The wood is soft, very durable, strong and splits easily. It was used for interior finishing and was in much demand for telephone poles, railroad ties and fence posts. The durability of the wood is due to the tannic acid which it contains.

The nuts contain a sweet meat and were once gathered in large quantities for the market.

Horsechestnut (*Aesculus hippocastanum* L.) is not related to the native chestnut. It comes from Asia and has been quite generally planted as a shade and ornamental tree.

It has a symmetrical, round or oval outline and rather stiff branch habit with the tips of the branches curving slightly upward when mature. It has a heavy, luxuriant foliage of deep green, changing to bronze in early autumn. The large, opposite leaves with from 5-7 leaflets, arranged palmately on a single stalk, distinguish it from any of our native trees. Taken together with the pyramids of white flowers blossoming in the early spring and the large burlike, leathery husk enclosing one or more smooth, mahogany-colored nuts, it is not easily confused with any other species. It makes a good shade tree but requires rich soil for its best development. It is quite subject to a leaf blight. The fruit is poisonous when taken internally. The buds are large, sticky, and nearly black.

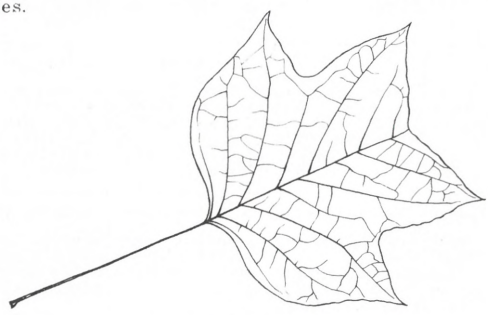


HORSECHESTNUT

Leaf with leaflets. One-third natural size. Twig with buds. One-fourth natural size.

The wood is soft, light, and close grained. In Europe it is used for wood carving and veneer.

Yellow-poplar (Tuliptree) (*Liriodendron tulipifera* L.) is found from Massachusetts southward but has been introduced as an ornamental statewide, except in Washington, Penobscot, Piscataquis, Somerset, and Lincoln Counties. The bark is at first smooth, green, with white streaks. Older bark is fissured and ridged. Leaves are alternate, lobed, and squarish at the tip. The flowers are tulip-like and yellow-green in color. The fruit is contained in a cone-like structure about 3 inches long. Winter buds are smooth with 2 duckbill-like scales. Pith is white and diaphragmed. This is reported to be the tallest native American hardwood species.



Leaf. One-fourth natural size.

OAKS

The Important Distinctions

Black Oak Group: leaf lobes sharp-tipped, acorns mature in two years and are hairy inside.

NORTHERN RED OAK	SCARLET OAK	BLACK OAK	BEAR OAK
Quercus rubra L.	Quercus coccinea Muenchh.	Quercus velutina Lam.	Quercus ilicifolia Wangenh.
Bark	**Bark**	**Bark**	**Bark**
Slightly ridged, dark gray to black; inner bark, reddish.	Ridges small, irregular, dark gray. Inner bark, pale reddish or gray.	Deeply fissured. Ridges very dark. Inner bark deep orange color or bright yellow.	Gray to dark brown.
Leaves	**Leaves**	**Leaves**	**Leaves**
Upper surface dull, dark green. Smooth beneath.	Upper surface bright green and shiny. Smooth beneath.	Upper surface dark green, shiny. Hairy beneath.	Dark green above, white, or gray, hairy beneath.
Fruit	**Fruit**	**Fruit**	**Fruit**
Acorn 2-4 times longer than cup. Cup is saucer-like, with scales fused.	Acorn about twice as long as cup. Cup is bowl-like, with shiny scales.	Acorn about twice as long as cup. Cup is bowl-like, with dull scales.	Acorn small. Nearly hemispherical, striped above middle. Cup shallow.
Winter Buds	**Winter Buds**	**Winter Buds**	**Winter Buds**
Conical, smooth, chestnut brown; scales silky at tip.	Small, light brown, rounded, and hairy at tip only.	Large, decidedly angled, coated with matted, wool-like hairs.	Small, short, blunt-pointed, with loose scales.

White Oak Group: leaf lobes rounded, acorns mature in one season and lack hairs inside.

WHITE OAK	BUR OAK	SWAMP WHITE OAK	CHESTNUT OAK
Quercus alba L.	Quercus macrocarpa Michx.	Quercus bicolor Willd.	Quercus prinus L.
Bark	**Bark**	**Bark**	**Bark**
Light gray. Ridges broad, flat, flaky.	Grayish, deeply furrowed, flaky.	Grayish-brown deeply fissured; broad, flat ridges, flaky.	Reddish brown to dark brown, furrowed.
Leaves	**Leaves**	**Leaves**	**Leaves**
Bright green, dull on upper surface.	Dark green, shiny on upper surface.	Slightly lobed. Dark green, dull on upper surface.	Many rounded tooth-like lobes. Shiny on upper surface.
Fruit	**Fruit**	**Fruit**	**Fruit**
2-4 times as high as cup. Short-stalked.	Twice as long as cup. Cup margin fringed with long, hair-like scales. Short-stalked.	3 times as long as cup. Margin of cup slightly fringed with scales. Long-stalked.	3 times as long as cup. Long and wrinkled. Cup hairy. Moderately long-stalked.
Winter Buds	**Winter Buds**	**Winter Buds**	**Winter Buds**
Broadly ovoid, rather blunt pointed, dark red-brown scales without hairs.	Broadly ovoid, sharp or blunt pointed, reddish brown, coated with soft hairs.	Roundish, blunt pointed, brown, small, without hairs.	Broadly ovoid sharp-pointed, yellowish brown, without hairs.

NORTHERN RED OAK *Quercus rubra* L.

Northern red oak is the most common species of oak in Maine, mainly in the southern half. Best growth is attained on rich upland soils.

It grows to a height of 50-60 feet and a diameter of 2-3 feet, forming either a narrow or broad head. The branches are stout, horizontal or upright.

The bark on the trunk of old trees is dark gray or nearly black, and is divided into rounded ridges. On younger trees and branches it is smooth and greenish - brown or gray. The inner bark is reddish.

NORTHERN RED OAK
Leaf and fruit.
One-third natural size.

NORTHERN RED OAK
Winter twig and buds.
One-half natural size.

The leaves vary in shape, are 5-8 inches long, alternate; dull, dark green above, yellow-green below, and have bristle-tipped lobes.

The flowers appear in May, while the leaves are only partly grown.

The fruit ripens the second year. The acorn is broad, large, 1-1¼ inches long, and up to 4 times longer than the shallow cup. The inside lining of the acorn is densely hairy. Its tannic acid content makes it bitter.

The twigs are smooth, greenish- to reddish-brown, and have a star-shaped pith.

The wood is hard, strong and heavy. It is used for furniture and interior finish, shipbuilding, planks and frames, lobster traps, flooring, implements, piling, cross-ties, plywood, slack cooperage, timbers, pallets, and dowels for poultry crates.

Q. rubra var. **borealis** has a smaller acorn, ¾-1 inch long, and only 3 times longer than the cup.

SCARLET OAK *Quercus coccinea* Muenchh.

Scarlet oak previously occurred locally in southern Maine. However, naturally growing specimens are believed to be rare. It grows on the dry soil of ridges or uplands.

The scarlet oak is a smaller sized tree than the red oak, growing to a height of 30-50 feet and 1-2 feet in diameter. The branches are slender and form an open, narrow head.

SCARLET OAK
Winter twig and buds. One-half natural size.

The bark on the trunk of old trees is separated into irregular ridges by shallow fissures, is dark gray with a reddish inner bark.

The leaves are alternate, 3-6 inches long with a variable outline. The upper surface is bright green and shiny, the lower being paler and less shiny. Lobes are sharp-tipped.

In the fall the leaves turn a deep scarlet, which accounts for the common name of the tree.

The flowers appear in May when the leaves are only partly developed.

The fruit ripens the second year. The acorn is about ½ inch long, about twice as long as the cup, and is from 1/3-½ enclosed by the cup. It is quite bitter.

The wood is hard, strong, heavy, but coarse-grained. Used to a limited extent for the same purposes as the red oak, except for plywood, furniture and implements.

BEAR OAK (Scrub Oak) *Quercus ilicifolia* Wangenh.

Bear oak is the scrub oak found in southern Maine. It is a small, shrubby tree, less than 20 feet high. It is quite common on the sand barrens of southern Maine and eastern Hancock county.

BLACK OAK (Yellow Oak) *Quercus velutina* Lam.

Black or yellow oak is found in southern Maine. It grows on dry ridges and gravelly uplands. It is fairly common near Fryeburg.

The branches are slender, and the head is narrow and open. It grows to a height of 50-60 feet and a diameter of 1-2 feet.

BLACK OAK
Leaf and fruit. One-third natural size.

The bark is smooth and dark gray or brown on young stems. On old trees, it is divided by deep fissures into broad, rounded ridges, and is dark to almost black. It is rougher than that of the red oak. The inner bark is a bright orange color or bright yellow and is a distinguishing feature. It is used for tanning.

The leaves are alternate, 5-6 inches long, the upper surface glossy, dark green, varying much in shape and general outline, usually 7 lobed with bristle points. Under surface generally hairy with more obvious, rusty hairs in axils of veins.

The flowers appear in May when the leaves are only partly grown.

The fruit matures the second season. The acorn is ½-¾ inch long, about twice as long as the cup and nearly ½ enclosed by it. The fruit is bitter.

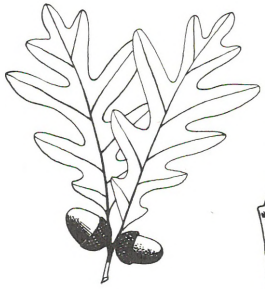
The twigs are smooth; buds are densely hairy, angled and yellowish-gray.

The wood is hard, heavy, strong, and coarse-grained, and is used for the same purposes as scarlet oak.

WHITE OAK *Quercus alba* L.

White oak, which gets its name from the color of the bark, occurs as far north as Oakland and Knox County. It grows on sandy land, gravelly ridges, and moist bottom lands, but makes the best growth on rich, rather heavy, upland soils.

In good situations, the white oak grows to a height of 60-70 feet and a diameter of 3-4 feet. When not crowded by other trees, the bole is short, the limbs large and diverging, and the head broad and rounded. In the forest, it has a long bole, and a narrow head.



WHITE OAK
Leaves and fruit.
One-third
natural size.

The bark on the trunk is separated into thin, irregular flakes and varies from a light to ashy-gray.

The leaves are usually 7 lobed, lobes rounded, shallowly cleft, or cleft nearly to the mid-rib, alternate, 4-7 inches long, bright green above, pale green or whitish beneath. They sometimes remain on the tree during the winter.

WHITE OAK
Winter twig
and buds.
One-half
natural size.

The flowers come out in May when the leaves are half grown.

The fruit ripens in September of the first year. The acorn is about ¾ inch long, from 2-4 times longer than the cup, and about ¼ enclosed by it. The fruit is edible. Indians pounded it into a flour and bleached out the tannin with hot water.

The twigs are gray to purple; buds are blunt-pointed and scales are without hairs.

The wood is strong, heavy, hard, and durable. It is used for ship and boat building, ties, tight cooperage, posts, poles, piling, plywood, agricultural implements, interior finish, furniture, flooring, and in limited quantities for pulp.

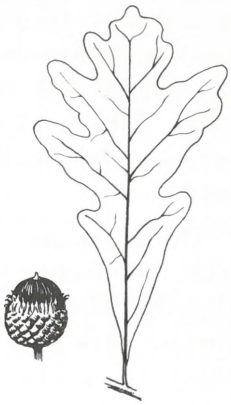
BUR OAK *Quercus macrocarpa* Michx.

Bur oak is locally plentiful in central Maine. It grows in low, rich bottom lands, and is rarely found on dry soil. It is quite common along the Sebasticook River, the lower Penobscot basin, and east into Hancock county.

It has a broad top of wide spreading branches. The trunk is often clear of limbs for 2/3 or more of its length. It attains a height of 60-70 feet, and a diameter of 2-3 feet.

The bark is grayish, deeply furrowed, and broken into plate-like irregular scales.

The leaves are roughly violin-shaped in outline, have rounded lobes, but mostly not as deeply cut as the white oak. The upper end of the leaf is widest. They are alternate, dark green and shiny on the upper surface, the lower, pale green or silvery white.



BUR OAK
Fruit and leaf.
One-third natural size.

The flowers appear in May when the leaves are partly formed.

The fruit matures the first year and is usually solitary. It varies much in size and shape. The acorn is about ¾ inch long, and about ½ enclosed by the cup. The margin of the cup is fringed with long, hair-like scales. The fruit is edible.

The twigs have corky wings or ridges.

The wood is very durable, hard, heavy, and strong. It is used for the same purpose as white oak, except for plywood, furniture, flooring and implements.

CHESTNUT OAK *Quercus prinus* L.

Chestnut oak is found on Mt. Agamenticus in the town of York and has been reported from Oxford County. Trees 6 inches in diameter and about 40 feet in height occur. The leaves are similar to those of chestnut, narrowly elliptical, with shallow rounded lobes, yellow-green above, hairy below. The large fruit is edible, ellipsoid, and the cup encloses ½ the acorn.

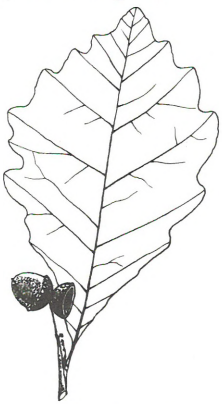
SWAMP WHITE OAK *Quercus bicolor* Willd.

Swamp white oak grows in moist, fertile soil, on the borders of swamps, and along streams. It is nowhere abundant, but occurs widely scattered in small groves only in York and Androscoggin counties.

It grows to a height of about 50 feet and a diameter of 2-3 feet. The limbs are small, usually pendulous. The head is narrow, open and round-topped.

The bark on old trees is deeply furrowed, divided into broad, flat ridges, flaky, and of grayish-brown color. On young trees and branches it is smooth and separates into papery scales which hang loosely.

The leaves are alternate, 4-6 inches long, slightly lobed, upper surface dark green, shiny, the lower, pale white or tawny.



SWAMP WHITE OAK
Leaf and fruit. One-third natural size.

SWAMP WHITE OAK
Winter twig and buds. One-half natural size

The flowers appear in May when the leaves are not more than half grown.

The fruit matures the first season. The acorn has a long stalk, is about one inch long, about 3 times as long as the cup and about 1/3 enclosed by it.

The twigs have a yellowish or a light orange to reddish-brown bark.

The wood is strong, heavy and hard and is used for the same purposes as the white oak.

ELMS

The Important Distinctions

AMERICAN ELM Ulmus americana L.	SLIPPERY ELM Ulmus rubra Mühl.
Habit Tall and variable in outline, yet typically vase-shape.	**Habit** Medium height. Head broad and almost flat.
Bark on Trunk Ashy-gray. Inner bark not mucilaginous.	**Bark on Trunk** Dark brown tinged with red. Inner bark mucilaginous.
Leaves Somewhat rough on the upper surface and smooth on the lower. Short-pointed tip.	**Leaves** Very rough on the upper surface; hairy and nearly as rough on the lower. Long-pointed tip.
Winter Buds Brown and smooth. The terminal bud is cocked at a 45 degree angle from the tip of the twig.	**Winter Buds** Dark reddish brown and covered with rusty hairs.

English Elm (Ulmus procera Salisb.), a native of Europe, is more compact, stiffer, and has a less spreading form than our native species. At a distance, it resembles oak rather than elm.

It has denser foliage and a longer leafing period than our native elms, and it is less liable to insect troubles. Leaves are similar to those of American elm but are smaller and more hairy below. The rough, coarse bark is divided by fissures into rather large plates on old trees. The almost black buds and the twigs are densely hairy.

Chinese Elm (Ulmus parvifolia Jacq.) and the **Siberian Elm** (Ulmus pumila L.) have been occasionally planted along our highways. The trees are brittle. Leaves are quite small, generally only singly serrate. Chinese elm fruits in the autumn unlike most other species of elm.

Scotch Elm (Ulmus glabra Huds.), is a native of Europe occasionally planted as a street tree in central and southern Maine, often mistaken for Slippery Elm. Leaves are simple to bear-paw shaped, and sandpapery to the touch on the upper surface.

Camperdown Elm (Ulmus glabra var. camperdowni Rehd.) is a short, spreading tree with pendulous branchlets and a round-topped head—thus its name also as the "umbrella elm".

AMERICAN ELM *Ulmus americana* L.

American elm is one of our largest and most graceful trees, and is of common occurrence throughout the state. It is found more often on rich bottom lands, and moist soil along streams but sometimes occurs on higher ground.

The trunk often divides into numerous limbs which form a vase-shaped or spreading round-topped head with graceful, drooping branches. It attains a height of 60-70 feet and a diameter of 2-4 feet.

AMERICAN ELM
Leaves and fruit. One-third natural size.

AMERICAN ELM
Winter twig and buds. One-half natural size.

The bark on the trunk is separated into broad ridges by deep fissures and is of an ashy-gray color on the surface. It shows alternate layers of chocolate brown and buff coloration beneath.

The leaves are alternate, 3-6 inches long, with coarsely doubly-toothed margins and uneven bases. The upper surface is dark green and somewhat rough.

The flowers appear in April before the leaves.

The fruit consists of a small, winged seed which ripens about the last of May before the leaves have fully developed. It has a wide, open notch at the apex, and a hairy margin.

The wood is rather coarse-grained, hard, heavy, strong, tough and hard to split. It is used for plywood, flooring, railroad ties, hoops, farm lumber and pulp.

SLIPPERY ELM (Red Elm) *Ulmus rubra* Mühl.

Slippery elm is rare in the state. The 1966 Checklist by Bean et al. shows this species to be occurring naturally only in York and Franklin Counties. It grows best on low, rich soil, though it sometimes occurs on higher ground. It grows up to 50 feet in height and 2 feet in diameter.

SLIPPERY ELM
Winter twig and buds. One-half natural size.

The head is very broad and almost flat.

The bark is thick, dark brown tinged with red, divided by shallow fissures into flat ridges and covered with flat scales. Inner bark is mucilaginous.

The leaves are simple, alternate, 4-6 inches long, sharply toothed, dark green and very rough on the upper surface and hairy on the under surface.

SLIPPERY ELM
Leaves and fruit. One-third natural size.

The flowers appear before the leaves about the middle of April. The fruit is small, flattened and winged without hairs on the margin. It ripens in late spring.

The winter buds are obtuse, dark brown in color and covered with rusty hairs.

The wood is heavy, strong and durable.

SASSAFRAS *Sassafras albidum* (Nutt.) Nees

Sassafras occurs in eastern Cumberland, southern Oxford and York Counties, and is sometimes planted for ornament.

The bark on young stems is thin and reddish brown. On older stems it becomes thick and scaly. Very fragrant.

The leaves are alternate, very hairy when they first appear, losing all this at maturity except on the midrib. They are light green and of 3 types; entire, mitten-shape, and 3 lobed.

The flowers open in early spring with the first leaves, in racemes containing about 10-15 flowers.

The fruit ripens in September and October and is a blue, lustrous drupe which is supported on a fleshy, red stalk.

The wood is soft, weak, brittle, very aromatic, light brown and very durable in the soil. The roots and bark are distilled for oil of sassafras, used to perfume toilet articles.

SASSAFRAS
One-third natural size.

WITCH-HAZEL *Hamamelis virginiana* L.

Witch-hazel occurs as a small tree or shrub in most parts of Maine except in the far north. It has scaly bark, zigzag branchlets, and exposed, hairy, scalpel-shaped buds. The leaves are alternate, broadly egg-shaped in outline, unsymmetrical at the base and have a wavy margin.

It is found on borders of the forest in low rich soil, or on rocky banks of streams. It has bright yellow flowers in the autumn. The fruit is a woody capsule, usually two in a cluster. The seeds are discharged violently when ripe. An extract from the bark is mixed with alcohol and used as an astringent.

AMERICAN SYCAMORE (Buttonwood, Planetree) *Platanus occidentalis* L.

American sycamore occurs rarely in the southern part of the state on the borders of streams and rich bottom lands. In Maine it does not attain any great size. The trunk may spread near the ground into several large, secondary limbs, or it may rise without branching for a considerable distance and then have large, spreading branches.

AMERICAN SYCAMORE
Leaf and fruiting head.
One-third natural size.

AMERICAN SYCAMORE
Winter twig and buds.
One-half natural size.

The bark on the trunk and large limbs is greenish-gray in color and flakes off in broad scales, exposing white patches beneath.

The leaves are simple, alternate, 3-5 lobed and light green. The base of the leaf-stalk is hollow and swollen, and covers the winter bud.

The fruit head generally occurs singly and is in the shape of a ball about an inch in diameter. It contains very many small, wedge, or shoenail-shaped nutlets, and usually remains on the tree until spring.

The twigs are zigzag in shape and are encircled by the conspicuous stipules. The winter buds have a single, wrinkled, cap-like scale.

The wood is hard, firm, very perishable when exposed to the weather, and liable to warp. It is used for furniture and interior finish of houses.

AMERICAN MOUNTAIN-ASH (Roundwood)
Sorbus americana Marsh.

American mountain-ash is not a true ash but is closely related to the apple. It rarely reaches a height of over 20 feet. It is particularly common in mountainous regions and along the coast. The leaves are alternate, compound with 13-17 long, tapered, finely toothed leaflets. The leaflets are 2-4 inches long, 5/8-1 inch wide, and without hairs. The small creamy-white flowers are borne in cymes. The fruit is bright red, berry-like, about ¼ inch in diameter. These remain on the tree late into the winter, and are sometimes used as an astringent in medicine. The bud scales are hairless and sticky. The pale brown wood is of little value as it is soft and weak.

MOUNTAIN-ASH
From Sargent's "Manual of the Trees of North America," by permission of Houghton, Mifflin Company.

SHOWY MOUNTAIN-ASH *Sorbus decora* (Sarg.) Schneid.

Showy mountain-ash is also found in many parts of the state. It is usually better balanced in outline than the American mountain-ash, and has a well-rounded crown. The leaves are alternate, compound, and differ from the preceding species in having leaflets which are only 1½-3 inches long, and 5/8-1 1/8 inches wide. The fruit is larger, up to ½ inch in diameter, and matures later in the season. The outer bud scales are sticky; inner scales are hairy.

The **European Mountain-ash** or **Rowan Tree** (S. aucuparia L.) is superior to the native species in the brilliancy of its fruit. The buds are silky and the leaflets somewhat hairy beneath. The fruit is large and abundant. The leaves are similar to those of the American mountain-ash but are blunt.

HAWTHORN (Thorn-Apple) *Crataegus* spp.

Hawthorn occurs in Maine as a low spreading tree or shrub, rarely reaching a height of more than 15-18 feet. 31 different species and varieties are found in the state. Hawthorns can usually be recognized by the small apple-like fruits and the thorns on the branches.

The bark is dark brown to ashy gray, somewhat scaly.

The leaves are alternate, doubly toothed, and usually somewhat lobed, thin and dark green.

HAWTHORN

One-half natural size.

The flowers appear about the first of June in flat, showy white clusters.

The fruit which is about ¾ inch in diameter resembles a small apple. The flesh is thin and mealy and encloses from 1-5 rounded nutlets. It is used for jellies.

The twigs are slender, rigid, usually armed with long thorns. They form a compact crown due to their somewhat zigzag method of growth.

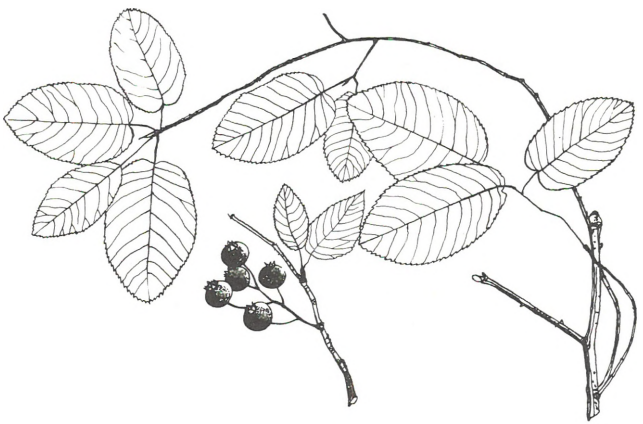
The wood is heavy, hard, and close grained. It is used to some extent for handles and other small articles.

DOWNY SERVICEBERRY (Shad Bush)

Amelanchier arborea (Michx. f.) Fern.

Downy serviceberry is usually found as a shrub, but it sometimes reaches a height of 25-30 feet. It is not common, but is known to occur throughout the State, except in Piscataquis, Somerset and Franklin Counties.

The bark is pale red-brown, streaked longitudinally with darker lines, and from ¼-½ inch in thickness on large trees. It is smooth and glossy.



DOWNY SERVICEBERRY

The leaves are alternate, heart-shaped or rounded at the base, finely serrate, and ovate or ovate-oblong in outline. When just unfolding they are green and densely hairy beneath. When mature they are dark green and dull above, pale below, 3-4 inches long, 1-2 inches wide, and downy on the petioles and underside of veins. They turn a bright clear yellow before falling in the autumn.

The flowers are characteristically the first tree flowers to appear in the spring, borne on slender stalks ½-1 inch long, in graceful, nodding, white, sweet-smelling racemes when the leaves are still folded.

The fruit is globose, berry-like, ripening in early summer, and 1/3-½ inch in diameter. It turns from bright red to a dark purple with a white bloom when ripe. It is dry and tasteless but may be eaten raw or cooked.

The wood is occasionally used for tool handles, small implements, and fish rods. It is heavy, hard, strong, close-grained, and dark brown tinged with red.

ALLEGHENY SERVICEBERRY *Amelanchier laevis* Wieg.

Allegheny serviceberry, the most common species, occurs as a small tree or shrub on acid soils in open hardwood stands, or along margins of open areas.

The bark is smooth, light violet-brown with a purplish cast, slightly fissured longitudinally and twisted on older stems.

The leaves are half grown at flowering time and have a reddish or purplish tinge. Mature leaves are dark green above and whitish below, 2-2½ inches long, 1-1½ inches wide, elliptic to ovate in shape with a rounded or heart-shaped base. Leaves are smooth in all stages and are alternate.

The fruit is berry-like, dark purple or almost black when mature, juicy and sweet to the taste.

Serviceberry winter buds are slender, twisted at the tip and contain silky hairs. Eight other species and 10 hybrids occur as small trees or shrubs in Maine.

CHERRIES AND PLUM

The Important Distinctions

PIN CHERRY Prunus pensylvanica L. f.	BLACK CHERRY Prunus serotina Ehrh.	COMMON CHOKE-CHERRY Prunus virginiana L.	CANADA PLUM Prunus nigra Ait.
Bark Reddish brown, nearly smooth. The large lenticels show orange when rubbed.	**Bark** Young trunks black with prominent white lenticels. Older trunks fissured and ridged with transverse broad, flat plates producing a blocked appearance.	**Bark** Dark grayish-brown, almost black.	**Bark** Dull reddish brown to black. Lenticels yellowish.
Leaves Long and tapering from base to the tip. Widest in the lower ⅓; thin and firm-textured with rounded teeth. Glands on stalk, and no hairs on midribs.	**Leaves** Elliptic - oblong, widest in the center, thick, leathery and shiny. Underside of midrib near stalk end covered with rusty, brown hairs. Glands on stalk near blade. Margin has rounded teeth.	**Leaves** Obovate, widest in the terminal ⅓, sharply saw-toothed and without hairs, medium - leathery in texture, glands on stalk and no brown hairs on midrib.	**Leaves** Ovate or obovate tapering abruptly into a long thin point. Teeth rounded. Glands on stalk.
Fruit Bright red in color, ¼ inch in diameter, hang in umbellate or corymbose clusters.	**Fruit** Black in color, ½ inch in diameter and are produced in a raceme. The individual fruit has a persistent basal disc.	**Fruit** Deep red to purple in color, ¼-½ inch in diameter, produced in racemes, basal disc not persistent.	**Fruit** 1 inch in diameter. Light red to yellow. Football-shaped with a longitudinal furrow.
Winter Buds Small, ovoid, red-brown in color.	**Winter Buds** Ovate, flattened, red-brown with a lighter or greenish margin.	**Winter Buds** Strictly cone-shaped, slender, pointed, with a purple to tan pattern. Side buds not flattened.	**Winter Buds** Cone - shaped, pointed, gray-brown.
Twigs Red or reddish-brown, very fine with a very slight cherry odor.	**Twigs** Reddish - brown, waxy, producing a sharp, pungent smell when broken.	**Twigs** Gray or purplish-brown, medium slender with a very strong, pungent, skunky odor.	**Twigs** Current growth gray, older growth gradually darkening to black. Thorns common on older twigs.

Beach Plum (P. maritima Marsh.) is a low shrub commonly found east to Knox County in localized coastal areas on sea beaches and dunes. The leaves are ovate to elliptic, acute or obtuse at the tip, teeth without glands, smooth above and hairy below. The flowers are white. The fruit is globose, one-half to three-fourths inch in diameter, purple or red, with a bloom, and makes a delicious jelly. The fruit stone is round. The twigs and buds have velvet-like hairs.

The twigs and branches of cherry and plum trees may be distorted by the "black knot" fungus (Dibotyron morbosum (Schw.) Th. & Syd.)

PIN CHERRY (Fire Cherry) *Prunus pensylvanica* L. f.

Pin cherry is a tree of small size, seldom growing taller than 25-30 feet and 6-10 inches in diameter. It has slender, horizontal branches and a narrow, somewhat rounded head.

It is common in the state but of little value except as a protection and cover for the soil on recent clearings or burned areas.

The bark on the trunk of old trees is dark red-brown and broken into thin plates. That on young trees is smooth and reddish brown. The inner bark is slightly aromatic and very bitter. The large lenticels show orange when rubbed.

PIN CHERRY

Leaves, flowers and fruit. One-third natural size.

The leaves are alternate, narrow to oblong, widest in the lower third, rather sharp pointed, finely and sharply toothed on the edges, bright green and shiny above, without hairs below, 3-4 inches long, bitter and aromatic, with glands on petiole.

The flowers are white, in clusters of 4 or 5 and appear in May when the leaves are only about half grown.

The fruit is bright red, almost translucent, about the size of a pea, globular in shape, and ripens from the first of July to August.

The twigs are shiny, reddish-brown and very slender. The buds are small, ovoid, reddish-brown and clustered at the end of twigs.

The wood is coarse-grained, soft and light. It is not used commercially. The gum is edible.

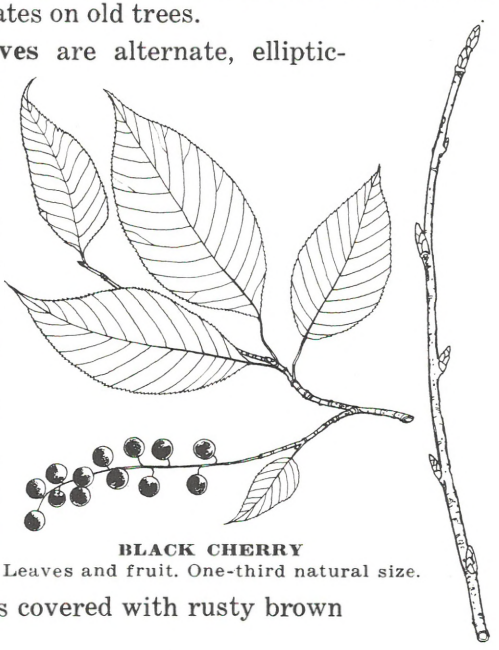
BLACK CHERRY *Prunus serotina* Ehrh.

Black cherry is widely distributed in the state and is one of our most valuable timber trees but is not abundant in sufficient size. It grows on a variety of soils but makes rapid and best growth on rich, moist land.

It has small horizontal branches, a narrow head, and attains a height of 40-50 feet and a diameter of 10-20 inches.

The bark on the trunk is red-brown to black and rather shiny with prominent white lenticels on young trees; darker and broken into small irregular plates on old trees.

The leaves are alternate, elliptic-oblong, widest at the center, finely toothed, dark green, shiny, thick, somewhat leathery, and 2-5 inches long. The underside of the mid-rib near the stalk end is covered with rusty brown hairs.



BLACK CHERRY
Leaves and fruit. One-third natural size.

BLACK CHERRY
Winter twig and buds. One-half natural size.

The flowers are produced in many flowered racemes 4-5 inches long, appearing the last of May or early June when the leaves are half grown.

The fruit is in drooping racemes, dark purple or almost black when ripe, about the size of a pea and globular in shape. It ripens from June to October.

The twigs give off a pungent odor when broken, and the bark has a bitter taste.

The wood is rather hard, close-grained, light, strong, and can be polished easily. It is used for cabinet making, interior finishing, woodenware, veneer, and plywood.

COMMON CHOKECHERRY *Prunus virginiana* L.

Common chokecherry, a shrub or occasionally a small tree, occurs throughout the state, especially along fence rows in farming communities. It occasionally is 25 feet high and 6 inches in diameter.

The bark is smooth, dark gray-brown to black, and strongly and disagreeably scented. It is usually marked by long, light colored fissures.

The leaves are alternate, dull, widest at the terminal 1/3, 2-4 inches long, finely toothed on the edges, and at maturity are medium-leathery in texture without hairs.

CHOKECHERRY

Leaves and fruit. One-third natural size.

The flowers appear from the first of May to June on slender stalks in racemes.

The fruit ripens from July to September and is about ¼-1/3 inch in diameter, at first bright red, turning at maturity to a dark red or nearly black. Fruit slightly astringent, but edible.

The winter buds are strictly cone-shaped, slender and pointed with a definite purple and tan pattern on the scales. Side buds are not flattened as in black cherry.

The twigs have a strong, pungent, skunky odor when broken and are frequently distorted by a black, warty, fungus growth called "black knot."

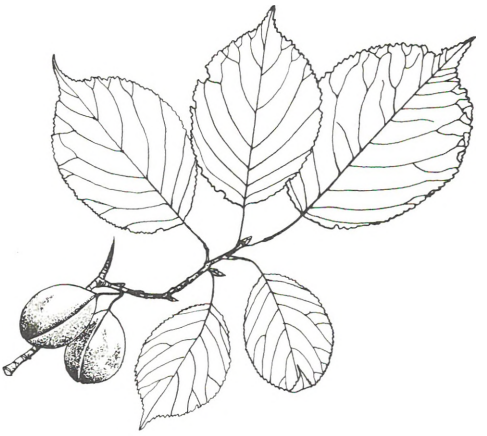
The wood is heavy, hard, but not strong and is not used commercially.

CANADA PLUM (Red Plum) *Prunus nigra* Ait.

Canada plum is a common tree throughout the state, except in densely forested areas, usually occurring in thickets. It is seldom found over 8 inches in diameter and 30 feet high.

The bark is thin, dull reddish brown to black, peeling in thin papery scales and exposing the shiny reddish brown, inner bark.

The leaves are alternate, egg-shaped in outline, and taper at the apex to a long sharp point. Dark green on the upper surface, lighter below; margin with glandular, rounded teeth.



CANADA PLUM

Leaves and fruit. One-third natural size.

The flowers are white and appear early in the spring before the leaves, in groups of 3 or 4 on slender stalks.

The fruit ripens the latter part of August, is football-shaped and furrowed along one side, has an orange-red skin and yellow flesh. The single stone is flattened and slightly grooved on the edges. Fruit is edible.

The twigs and branches often have thorns; the buds are brown to gray, and are without hairs.

It is not used commercially except as an ornamental tree.

Black Locust (*Robinia pseudoacacia* L.) is not a native of this state, but has been planted to quite an extent and in some localities is quite abundant. It is found mostly near dwellings or on abandoned farmlands, where it often becomes naturalized.

The locust is a rapid grower, frequently attaining a height of 20 feet in 10 years, but increasing much more slowly thereafter. It reaches a height of about 50 feet and a diameter of 8-20 inches. The branches are small, brittle, sometimes slightly many-angled, and at first are armed with stipular spines. The top is narrow and oblong. It is one of the last trees to send out foliage in the spring.

The bark on old trees is dark brown, deeply furrowed and broken into small scales.

The leaves are alternate, once compound, 8-14 inches long; have from 7-19 leaflets which are about 2 inches long with an entire margin and a slightly notched tip.

The flowers are borne in loose racemes 4-5 inches long and appear in June. They are showy and very fragrant.

The fruit is a smooth, flat, dark purplish-brown pod about 3 inches long, containing from 4-8 bean-like seeds.

The wood is heavy, close-grained, strong, and very durable in contact with the soil. It is used for fence posts and farm construction.

BLACK LOCUST
Leaf with leaflets and fruit.
One-fourth natural size.

Clammy Locust (R. viscosa Vent.) is another species found near habitations and is distinguished from the above by the sticky material covering the twigs.

Honeylocust (*Gleditsia triacanthos* L.) is not native in Maine, but has been frequently planted in urban areas in the southern and central portions of the state. It has escaped in the town of Paris.

It has somewhat pendulous, slender spreading branches that form an open, broad, flattopped head. Simple or usually 3 forked spines, 1½-3 inches long or longer, occur on the branches and trunk. A thornless form, *G. triacanthos* f. *inermis* (L.) Zabel, is preferred in plantings. It attains a height of 75 feet and a diameter of 20 inches.

The bark is divided into long, narrow ridges by deep fissures and the surface is broken into small scales that are persistent.

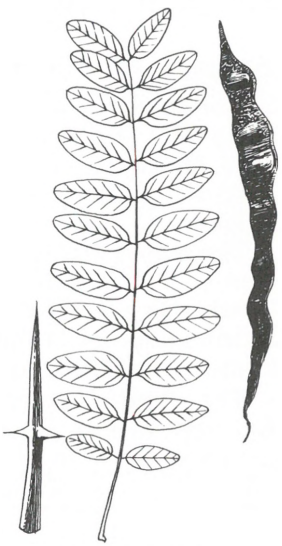
The leaves are alternate, both once and twice compound, 4-8 inches long and have from 18-28 leaflets. The margins of the leaflets are finely blunt-toothed.

The flowers are borne in slender clusters from 2-2½ inches long. They appear in June when the leaves are about fully grown. Staminate and pistillate flowers are produced separately on the same tree.

The fruit is a shiny, reddish brown, flattened pod 12-18 inches long. The walls are thin and tough.

The twigs are smooth and distinctly zigzag in shape. Winter buds barely protrude from the leaf scar.

The wood is coarse-grained, hard, strong, and very durable in contact with the soil. It is used for fence posts in Maine.



HONEYLOCUST
Spur, natural size, and leaf with leaflets, and fruit.
One-third natural size.

STAGHORN SUMAC *Rhus typhina* Torner

See page 3 for illustration.

Staghorn sumac occurs mainly as a shrub practically throughout the state. It has alternate, compound leaves with 11-31 opposite, serrated leaflets. The twigs are very hairy. The flowers form in early summer in large, compact, yellow panicles 2-8 inches long. The fruit ripens in August as a spire of showy, red, velvety berries. The plant is not poisonous.

POISON-SUMAC *Toxicodendron vernix* (L.) Ktze.

See page 3 for illustration.

Poison-sumac is found throughout the southern part of the state, occurring as a tree in low, wet swamps. It is particularly common around Mt. Agamenticus in York.

The leaves are alternate, 7-14 inches long, consisting of 7-13 leaflets along a smooth greenish-red rachis. Leaflets have entire margins, short stalks, are dark green and lustrous above, with scarlet midribs; paler and glabrous below.

Twigs are without hairs.

The fruit is a globose, slightly compressed, thin-fleshed, ivory white or tawny white berry, about 1/5 inch in diameter, borne in loose, pendent, axillary clusters, ripening in September, but persisting on the tree far into the winter.

POISON-IVY (Mercury) *Toxicodendron radicans* (L.) Ktze.

See page 3 for illustration.

Poison-ivy is widely distributed throughout the state and grows as an aerially-rooted climbing vine on trees, or as a smooth, trailing vine or erect shrub along stonewalls, fencerows and roadsides.

The leaves are alternate, compound, with 3 very shiny, dark green leaflets. Leaflet margins are lobed, wavy, toothed or entire. The stalk of the terminal leaflet is much longer than those of the 2 lateral leaflets. Fall color is a fiery red.

The fruit is creamy-white, ribbed, globular, b-b sized drupes, occurring in axillary clusters.

CAUTION: Severe dermatitis results when skin comes in contact with roots, stems, leaves, flowers or fruit, or with implements or clothing that have come in contact with plant parts of either poison-ivy or poison-sumac. Smoke resulting from the burning of plant parts of either species is also believed to be poisonous.

Smooth Sumac (R. glabra L.), and **Shining Sumac** (R. copallina L.) are not poisonous and are found as shrubs in Maine.

MAPLES*

The Important Distinctions

SUGAR MAPLE Acer saccharum Marsh.	SILVER MAPLE Acer saccharinum L.	RED MAPLE Acer rubrum L.	STRIPED MAPLE Acer pensylvanicum L.
Bark	**Bark**	**Bark**	**Bark**
Gray on old trunks. Rough and deeply furrowed. Smooth and slightly fissured on young trees.	Dark gray with reddish tinge on old trees; somewhat furrowed. Separates into thin plates. On young trees, smooth, gray with faint tinge of red.	Dark gray on old trees. Ridged and broken into plate-like scales. Light gray and smooth on young trees.	Marked with whitish stripes running lengthwise of trunk. Reddish brown or dark green.
Leaves	**Leaves**	**Leaves**	**Leaves**
3-5 lobes, margins sparingly toothed, sinuous, sides of terminal lobes flare outward, under-surface pale green. Notches between lobes rounded.	5 lobes, rarely three. Lobes long and narrow, irregularly and sharply toothed. Under surface silvery white.	3-5 lobes. Lobes irregularly doubly toothed. Whitish on under surface. Sides of terminal lobe converge. Notches between lobes V-shaped.	3 lobes, shaped like a duck's foot, thin, edges finely and sharply toothed.
Flowers	**Flowers**	**Flowers**	**Flowers**
Greenish yellow, appearing with the leaves.	Greenish yellow or pinkish, appearing long before the leaves.	Scarlet or yellowish red, appearing before the leaves.	Bright yellow, appearing after leaves are full grown.
Fruit	**Fruit**	**Fruit**	**Fruit**
Paired and slightly divergent. Seed body baseball-shaped. Wings one inch long.	Paired, but with one usually abortive. Wings strongly divergent, two inches long and hooked. Seed body football-shaped.	Paired, slightly divergent. Seed body oval in outline. Wings red about ¾ inch long.	Paired and moderately divergent. A large, smooth depression in the seed body.
Winter Buds	**Winter Buds**	**Winter Buds**	**Winter Buds**
Terminal bud ¼ inch long sharp-pointed, purplish brown to gray with many scales showing.	Terminal bud ⅜ inch long, blunt-pointed, bright red above, green below, slightly ridged.	Terminal bud ⅛ inch long, blunt-pointed, dark red, about as long as broad.	Terminal bud nearly ½ inch long, bright red, distinctly stalked with 2 scales showing.

* Insufficient space in the key to include the native **Mountain Maple** (A. spicatum Lam.) and the apparently exotic **Box-elder** (Acer negundo L.). See p. 74 and 75.

Cutleaf Silver Maple varieties are very similar to the silver maple, but have a more deeply-lobed leaf and the branches and twigs are more droopy. These varieties are utilized mainly for ornamental and shade tree plantings.

Norway Maple (A. platanoides L.) is an exotic from Europe and Asia and is becoming a favorite for shade tree plantings. It resembles somewhat the sugar maple, but the leaves are larger, darker green, and the petiole gives off a milky juice when broken, which is not common to any of our native maples. The terminal buds are usually of a larger diameter than the end of the twigs. There are many varieties of Norway maple. The **Schwedler** or red-leaved variety (A. platanoides var. schwedleri Nichols.) is also common as a shade tree in Maine. The leaves are dark reddish-green turning to green later in the season.

SUGAR MAPLE (Rock or Hard Maple) *Acer saccharum* Marsh.

Sugar maple is found abundantly throughout the state on moist, rocky slopes, but grows best on moist, upland soils.

In the forest it grows to 60-70 feet, and a diameter of 20-30 inches. The trunk is without branches for quite a distance. The top is short and spreading. In the open, the branches begin 8-10 feet up, forming an egg-shaped head when the tree is young, and a broad rounded top when older. It makes a nice street or ornamental tree—as such, globe and columnar shapes are available at nurseries.

Bark on young trees and large branches is smooth or slightly fissured and pale. On old trees it is deeply furrowed and light gray, sometimes rather dark.

Leaves are opposite, 3-5 lobed, sparingly toothed, 3-5 inches long, dark green above, pale green below.

SUGAR MAPLE
Leaf and fruit.
One-third natural size.

Sides of the terminal lobe are parallel or divergent and notches between lobes are rounded. In autumn leaves turn various shades of red, scarlet, orange or yellow.

Flowers are pendulous, on long, slender, hairy stalks, in clusters, greenish yellow, and appear with the leaves.

Fruit is paired, has a baseball-shaped seed-body with wings about one inch long, slightly divergent. It ripens in the fall.

Wood is heavy, close-grained, strong, and hard. It is used for furniture, flooring, tool handles, veneer, railroad ties, bowling pins, novelties, dowels, woodenware, canoe paddles, pulp and charcoal. "Birds-eye" pattern wood is in high demand in the furniture industry.

Maple sugar and syrup are made largely from the sap of this tree, although sugar is present in the sap of all maples.

Black Maple (A. nigrum) is found in southern Maine, leaves are similar but 3-lobed and pubescent.

SILVER MAPLE (Soft Maple) *Acer saccharinum* L.

Silver maple is a common tree in the state, except along the coast, and is abundant in some localities. It grows largely on sandy banks along streams.

It usually grows to a height of 60-80 feet and a diameter of 2-3 feet. The trunk normally separates into 3 or 4 upright, secondary stems, destitute of branches for some distance. The branches are long and slender, often pendulous.

The bark on young trees is smooth, gray, slightly tinged with red. On old trees it is furrowed more or less, separates into large thin scales and is reddish brown in color. On the twigs it is chestnut brown and shiny.

SILVER MAPLE
Leaf and young fruit.
One-third natural size.

The leaves are opposite, deeply 5 lobed and the edges are irregular and sharply toothed. The upper surface is pale green, the lower, silvery white. They turn a pale yellow in the fall.

The flowers are on very short stalks and in clusters. They are greenish yellow or sometimes pinkish, opening early, long before the leaves appear.

The fruit is paired, winged and ripens in the spring. Frequently, one of the pair is abortive.

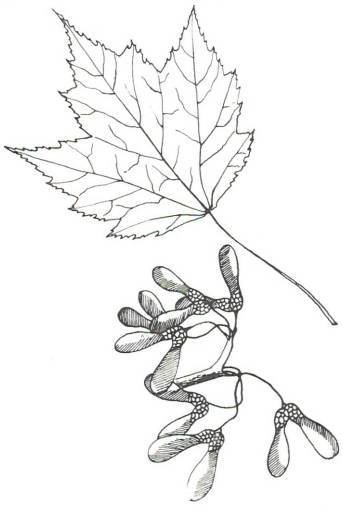
The twigs are curved upward at the tip, orange or red-brown above and green below, slender, with a bitter taste and a rank odor when broken.

The wood is softer than that of the hard maple, close-grained, not durable, and easily worked. It is used to a limited extent for pulp.

RED MAPLE (Swamp Maple) *Acer rubrum* L.

Red maple is a rapid grower and is the most abundant of the maples. It is typically found in swamps, and poorly drained sites, but also occurs elsewhere.

The red maple is a medium sized, slender tree that becomes 50-60 feet high, and 1-2 feet in diameter. The branches are upright, forming a somewhat narrow head. Usually the trunk is not divided.



RED MAPLE Leaf and fruit. One-third natural size.

RED MAPLE Winter twig and buds. One-half natural size.

The bark on young trees is smooth and light gray. On old trunks, it is dark gray, ridged and broken into plate - like scales.

The leaves are opposite, 3-5 lobed, margins irregularly doubly toothed, 3-5 inches long, upper surface light green; lower, white. The sides of the terminal lobe converge toward the tip, and the notches between lobes are v-shaped. In the fall, they turn scarlet and orange.

The flowers are produced in clusters on stalks before leaf buds open. Males are yellowish-red while females are bright scarlet.

The fruit is winged, ripens in the spring or early summer, and germinates as soon as it falls. Wings are only slightly divergent, about ¾ inch long. The seed body lacks a depression.

The twigs are straight, stiff, do not have a rank odor when broken, and are red in color on both surfaces. Buds are red and often clustered.

The wood is close-grained, heavy, moderately strong, and easily worked, not durable and will take a good polish. It is used mainly for pulp, but also for pallets, furniture stock, canoe paddles, and some turnery products.

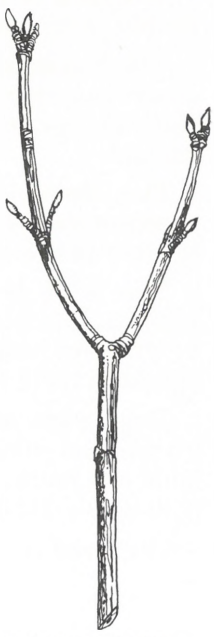
STRIPED MAPLE (Moose Wood) *Acer pensylvanicum* L.

Striped maple is of common occurrence. It is a shade-loving tree, and is usually found growing with other hardwoods or sometimes with conifers on rich, moist soils or rocky slopes. It is of little value except for its beauty.

It rarely gets above a height of 25 feet and a diameter of 8 inches. The branches are slender and upright, and the top narrow and often short.

The bark on the trunk is reddish brown or dark green and is marked by whitish lines running lengthwise, which turn brown after a time.

STRIPED MAPLE
Leaf and fruit.
One-third natural size.



STRIPED MAPLE
Winter twigs and buds.
One-half natural size.

The leaves are 3 lobed toward the apex, resembling a goose foot, opposite, finely toothed, pale green, 5-6 inches long and about as broad. In the fall they become light yellow in color.

The flowers are bright yellow in slender drooping racemes opening the last of May or in June when the leaves are fully grown.

The fruit is paired, with wings moderately divergent, fully grown in late summer. It has a smooth, oval depression in the seed body.

The twigs are smooth, reddish or greenish; the buds are valve-like, stout, stalked, and without hairs.

The wood is close-grained, light and soft.

MOUNTAIN MAPLE *Acer spicatum* Lam.

Mountain maple is common in Maine, especially in the northern part of the state. It occurs as a small bushy tree seldom over 30 feet in height. The tree at times forms fairly dense thickets due to its habit of growing in clumps. It grows best in a wet habitat or on damp, northern slopes. The slender twigs grow in a somewhat upright position.

The bark is reddish brown to gray in color. It is thin, and somewhat furrowed.

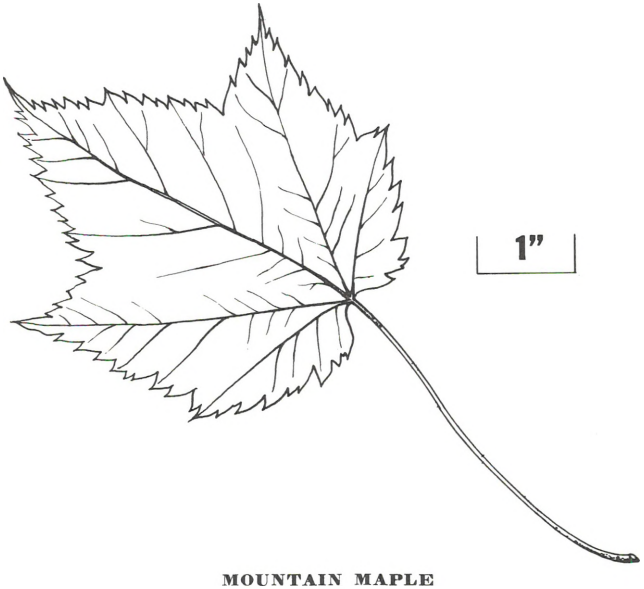
The leaves are opposite, 3 lobed, shiny above, somewhat hairy below. They have rather coarse teeth and prominently sunken veins on the upper surface.

The flowers appear in June in long, hairy, greenish yellow clusters after the leaves are practically full grown.

The fruit is paired, with wings slightly divergent, and occurs in ascending clusters. It has a wrinkled depression on the seed body, and ripens in early fall.

The twigs are hairy, green, red, or reddish brown, not striped, and the pith is brown. The buds are hairy, valve-like, green, and only slightly stalked, slender and pointed.

The wood is close-grained, soft, and light.



MOUNTAIN MAPLE

BOXELDER (Ashleaf Maple)

Acer negundo L.

Boxelder apparently is not native to Maine, but is largely planted as an ornamental tree throughout the state and has escaped in localized areas near habitation. It was introduced along the St. John River in Aroostook County at an early date. It reaches a maximum height of 50 feet and diameter of about 2 feet in Maine. It is a short-lived, fast growing, brittle tree, very subject to wind and ice damage.

The bark is light gray and smooth on young stems, becoming roughened and shallow-fissured on older trees.

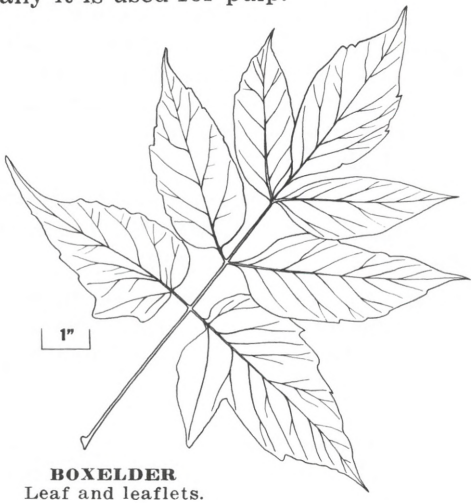
The leaves are opposite, compound, usually 3-7 leaflets per leaf, rarely 9. The leaflets vary greatly in shape, often lobed and unlobed leaflets are found on the same leaf. Leaflets are occasionally divided into individual blades.

The flowers open just before the leaves in the spring and are yellow-green. They have no petals.

The fruit attains mature size in summer, ripening in autumn, consisting of a double winged pair of seeds. Wings are only slightly divergent and the seed body is wrinkled, three times longer than broad.

The twigs are smooth, rather stout, green or maroon in color, and covered with a white, chalky bloom. The bark yields a pungent odor when bruised.

The wood is light, soft, creamy white, often tinged with green, weak and close-grained. Occasionally it is used for pulp.

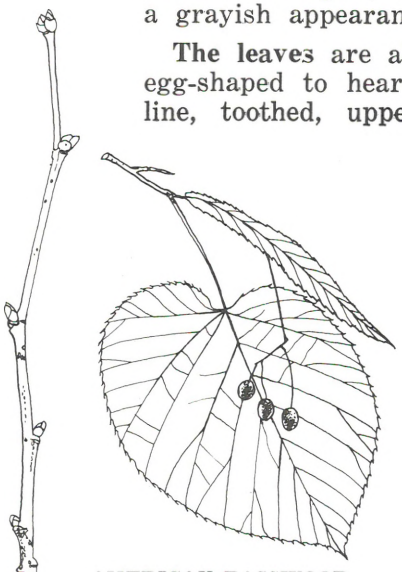


BOXELDER
Leaf and leaflets.

AMERICAN BASSWOOD (Linden)
Tilia americana L.

American basswood may grow to a height of 50-70 feet and a diameter of 2-3 feet. The branches are slender, somewhat pendulous, comparatively small and numerous, forming a broad and rounded head.

The bark on the trunk of old trees is deeply and irregularly furrowed. On young trees, it is smooth or slightly fissured and has a grayish appearance.



AMERICAN BASSWOOD
Leaf and fruit.
One-third natural size.

AMERICAN BASSWOOD
Winter twig and buds.
One-half natural size.

The leaves are alternate, broadly egg-shaped to heart-shaped in outline, toothed, upper surface dark green; lower, yellow-green and shiny, 5-6 inches long. The leaf base is uneven.

The flowers are greenish yellow, borne on a slender stalk which is attached to a rather long, yellowish, leaf-like bract. They are fragrant, contain an abundance of nectar and open in July.

The fruit is clustered, spherical, covered with short buff-colored hairs, woody, and is about as large as a pea. It remains attached to the leaf-like bract when it falls.

The wood is light, soft, and easily worked. It is used for mouldings, yardsticks, oars, veneer, pattern stock, excelsior, and pulp.

Bees make an excellent grade of honey from the flowers. The young fruit and flowers ground into a paste make an excellent substitute for chocolate.

The **European Linden** (T. europaea L.), and **Little-leaf Linden** (T. cordata Mill.) are commonly planted as shade trees. They are smaller than our native species, with smaller leaves.

FLOWERING DOGWOOD *Cornus florida* L.

Flowering dogwood is an unusually beautiful shrub or small tree and probably occurs naturally only in York County. It reaches a height of 12-20 feet.

The leaves are opposite, entire, ovate to elliptic, bright green and smooth above, pale green and with hairs on the veins beneath. They are 3-6 inches long.

The flowers are conspicuous and appear early in the spring. They are greenish white or yellowish and are arranged in dense umbels surrounded by 4 large, white petal-like bracts which give the appearance of large spreading flowers.

The fruit is a bright red, ellipsoid drupe about ½ inch long and occurs in clusters.

The twigs are smooth, greenish, and angular. The buds are covered by 2 valve-like scales.

ALTERNATE-LEAF DOGWOOD

(Blue Dogwood) *Cornus alternifolia* L. f.

Alternate-leaf dogwood occurs throughout the state as a shrub or small tree of up to 20 feet tall.

The leaves are alternate, entire, elliptic-ovate, and tend to be crowded at the ends of the twigs. They are 2½-4½ inches long, yellowish green, smooth above, and have appressed hairiness beneath.

The flowers appear in June after the leaves have developed and occur in creamy white clusters.

The fruit is a bluish black drupe, somewhat round, about 1/3 inch in diameter, and ripens in September and October.

The twigs are often lustrous, and are greenish brown. Dead twigs become bright yellow-green in color.

ROSEBAY RHODODENDRON (Great-Laurel)

Rhododendron maximum L.

See page 2 for illustration.

Rosebay rhododendron is a shrub or straggling tree up to 30 feet high. It is a very rare species found locally in parts of Somerset, Franklin, Cumberland and York Counties in damp woods or near pond margins.

The leaves are evergreen, ovate to oblong, alternate, entire, 4-8 inches long, thick and leathery, with the margin frequently rolled under. They are smooth and dark green above, pale below.

The flowers are bell-shaped and occur in dense clusters. They are generally white with a pinkish tinge, with variations possible.

The fruit are oblong, woody capsules covered with sticky hairs. They are borne terminally in erect clusters on stalks several times longer than the capsule.

The twigs are hairy.

MOUNTAIN-LAUREL *Kalmia latifolia* L.

See page 2 for illustrations.

Mountain-laurel is an erect-stemmed low shrub or small tree of rocky woods or low ground. It is widely distributed but local; absent in Somerset, Franklin, Kennebec and Androscoggin Counties.

The leaves are evergreen, green on both sides, elliptical, up to 3 inches long and 1 inch wide. They are flat, thick and leathery with an entire margin, and are narrowed at both ends. Arrangement is mostly alternate, sometimes opposite and rarely in three's, grouped at the tip of the twig.

The flowers are pink in color with variations possible, and are borne in erect, terminal clusters.

The fruit are globose, woody capsules borne on erect, hairy, sticky stalks that are many times longer than the diameter of the capsules. The capsules have long, persistent styles.

The twigs are rounded, sticky at first but later becoming smooth.

Protection of both the rosebay or great-laurel and the mountain-laurel is provided by Maine Statutes under Title 17 MRSA Sec. 2502 which states "Whoever without the consent of the owner of the land whereon the same may be growing injures, destroys, digs up or removes any rhododendron maximum linnaeus or kalmia latifolia linnaeus, or any part or parts of the plant of either of said species growing upon the land of another, shall be guilty of a misdemeanor and shall be punished by a fine of not more than $100, and in addition thereto shall be liable to the owner of the land upon which the same was growing in a civil action in treble damages."

BLACK TUPELO (Blackgum)

Nyssa sylvatica Marsh.

Black tupelo is found as far north as Waterville but is not common except in swamps in York County. Trees 2 feet in diameter are found in the Town of Casco on an island in Sebago Lake. Large specimens have also been reported on the south side of Pleasant Mt. in Denmark on a flat, open, wet area. It is easily distinguished at a distance by its numerous slender horizontal branches. The tree rarely reaches more than 50 feet in height. It occurs in rich moist soils, such as swamps or borders of rivers.

The bark on young trees is smooth, grayish and flaky, later becoming reddish to grayish brown and on old trees forms coarse blocks or ridges.

The leaves are alternate, oval to obovate in shape, 2-5 inches long, wedge-shaped at the base and pointed at the tip. The edges are usually entire. The leaves are dark green, shiny above, occasionally hairy below, turning bright crimson in the autumn.

The fruit is dark blue, fleshy, approximately ½ inch in length and is borne in clusters of 1-3 on long, slender stems. The fruit has an acid taste but is edible.

The twigs are moderately stout with a diaphragmed pith.

The wood is heavy, fine grained, very tough but not durable. It was formerly used for the hubs of wheels, and for soles of shoes. It is now used principally for pulp.

BLACK TUPELO

Leaves and fruit. One-fourth natural size.

ASHES

The Important Distinctions

BLACK ASH Fraxinus nigra Marsh.	WHITE ASH Fraxinus americana L.	GREEN ASH* Fraxinus pennsylvanica Marsh.
Leaves Have 7-11 toothed leaflets which are without stalks except the one at the end. Hairs lacking below except for buff-colored hairs at the junction of the leaflets and the rachis. Turn yellow in the autumn.	**Leaves** Have 5-9 leaflets, usually 7, which are borne on stalks, without hairs below. Turn purple in the autumn. Leaflets mostly entire.	**Leaves** Have 7-9 leaflets borne on stalks. Hairy below and on rachis. Turn yellow or bronze in the autumn.
Fruit Flat, wing completely surrounding seed body. The seed body is slightly twisted and is less than half the length of the fruit.	**Fruit** Cigar-shaped seed body, wing terminal.	**Fruit** Seed body funnel-shaped grading gradually into wing.
Winter Buds Black or very dark terminal bud. Less than one-fourth inch long, sharply pointed.	**Winter Buds** Brown terminal, one eighth inch long, blunt pointed	**Winter Buds** Brown terminal, one-eighth inch long, cone-shaped, and coated with rusty or dull red hairs.
Winter Twigs Pale gray, smooth. Not shiny. Inner bark of vigorous shoots is dirty white.	**Winter Twigs** Gray or greenish brown, smooth and shiny. Often with slight bloom. Very brittle. Inner bark of vigorous shoots bright brick-red.	**Winter Twigs** Greenish gray, somewhat covered with downy hairs. Inner bark of vigorous shoots cinnamon-colored.

* Specimens of green ash which lack hairs on the twigs or leaflets, but otherwise fit the above description, were formerly designated as var. lanceolata. They are now designated under the species due to the many gradations of the hairiness character.

BLACK ASH (Brown Ash) *Fraxinus nigra* Marsh.

Black ash is quite a common tree in Maine. It grows almost entirely on rich, moist ground or in cold, wet swamps and along the banks of streams.

It is a rather tall, slender tree, with slender branches and a short, narrow head. It grows to a height of 50-60 feet and a diameter of 10-20 inches. The trunk is often without branches for a considerable distance from the ground.

BLACK ASH
Leaf with leaflets, and fruit. One-third natural size.

The bark is gray to dark gray, corky and spongy, with more or less parallel ridges. It rubs off freely with the hand.

The leaves are 12-15 inches long, opposite, and have 7-11 leaflets which are 4-5 inches long, and without stalks except the one at the tip. Leaflets are lance-shape, and have remotely-toothed margins. The upper surface is dark green. There are buff-colored hairs at the junction of the leaflets and rachis.

The fruit is a single samara occurring in clusters. The seed is flattened and completely surrounded by the wing.

The twigs are smooth, gray to olive green. The buds are black or brown and pointed at the tip. The inner layer of the bark is dirty white.

The wood is coarse-grained, heavy, tough, durable, and pliable. It is used for interior finishing, cabinet work, barrel hoops, baskets, mouldings, door panels, plywood and, to a limited extent, pulp.

WHITE ASH *Fraxinus americana* L.

White ash is one of our valuable timber trees and is found quite commonly in the state. Best growth occurs on rich, rather moist soil of low hills.

It grows to a height of 60-70 feet and a diameter of 15-30 inches. The branches are upright or spreading, forming a narrow top in the forest.

The bark is broken into broad, parallel ridges by deep furrows, and is a dark brown or deep gray in color.

WHITE ASH
Leaf with leaflets, and fruit. One-third natural size.

The leaves are opposite, and consist of 5-9 leaflets, and are 8-12 inches long. The leaflets are 3-5 inches long, oval to lance-shape, borne on short stalks, edges remotely toothed towards the tip, dark green and often shiny on the upper surface. In the fall they turn to a soft velvety purple color.

The fruit is a single samara occurring in clusters. The seed body is cigar-shaped and has a terminal wing.

The twigs have a smooth, shiny bark which is grayish, greenish or maroon on the surface. The inner layer of the bark is brick red. The terminal buds are rounded or dome-shaped.

The wood is hard, strong, and tough. It is used for agricultural implements, tool handles, oars, furniture, interior finish, sporting goods and pulp.

GREEN ASH (Red Ash) *Fraxinus pennsylvanica* Marsh.

Green ash is not found as abundantly as the white and black ash, but is fairly common in central Maine. It is sometimes mistaken for the former. It grows near the banks of streams and lakes on rich, moist soil.

It has stout branches which bend downward on older trees. These form an irregular, compact head in the forest. It seldom exceeds a height of 50-60 feet and a diameter of 16-20 inches.

GREEN ASH
Leaf with leaflets, and fruit. One-third natural size.

The bark on the trunk of old trees is firm and furrowed like that of the white ash. In color, it is dark gray, or brown.

The twigs of the season are greenish gray and covered with numerous hairs; sometimes with no hairs. Inner bark is cinnamon red in color.

The leaves are 10-12 inches long, opposite and have 7-9 leaflets borne on stalks. Leaflets are 4-6 inches long, entire or wavy, or sometimes toothed, particularly on the upper ½ of the leaflets, yellow-green on the upper surface, hairy below and on the rachis, and oval to elliptical in shape.

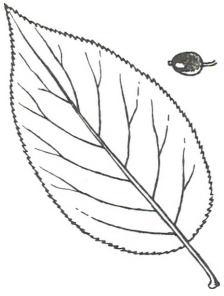
The fruit has a funnel-shaped seed body gradually blending into the terminal wing.

The wood is hard, heavy, fairly strong, coarse-grained, and brittle. It is used in the same way as white ash but is not as good a wood.

NANNYBERRY *Viburnum lentago* L.

Nannyberry occurs as a shrub or small tree, reaching a height of from 9-30 feet. It occurs quite generally in the state growing in moist soils often along the borders of swamps or streams. The leaves are opposite, ovate, abruptly pointed, with fine sharp teeth. The upper surface is a lustrous deep green. The under surface is lighter. The petiole is conspicuously flanged with a warty, wavy margin. The dark blue fruit ripens in the fall. It is about ½ inch long, ellipsoid, edible, sweet, tough-skinned, with a nipple-like tip. The fruit occurs in small drooping clusters on red-stemmed stalks and does not shrivel or shrink when ripe. The wood is orange-brown and has an unpleasant odor.

The terminal buds are shaped like a pair of rabbit ears, and bulge at the base. The 2 large bud scales extend beyond the end of the bud. They are nearly smooth and purplish brown to lead-colored. The twigs of the season are gray to gray-brown in color and smooth.



NANNYBERRY

Leaf and fruit.
One-half natural size.

AUTUMN COLORATION

Autumn foliage coloration, one of Maine's greatest aesthetic assets, is enjoyed year after year with little appreciation of the responsible causes. Hardwood trees in general have the inherited ability, in the presence of favorable climatic conditions, to produce obvious autumn leaf coloration. Conifers produce only weak colorations of yellow and brown. More foliage of conifers is retained each fall than is shed so that its normal green color predominates thereon. Larch is one exception. Its foliage becomes bright yellow prior to total shedding.

Hardwood leaves contain green, yellow and orange pigments in the summer. Chlorophyll gives the leaves their green color and is the most prominent of the pigments but also the least stable. It is continually produced and destroyed throughout the summer and masks the carotinoid pigments (xanthophyll and carotene) which give the yellow and orange shades. As autumn approaches, chlorophyll is destroyed faster than it is produced. As the chlorophyll disappears, the carotinoid pigments begin to show. The purple and brilliant red shades result at this time from the production of anthocyanin pigments which are also capable of masking the carotinoids. Tannins tend to cause brown shades in some species.

Conditions for maximum development of autumn coloration are: suitable summer rainfall, sugar accumulations in the leaves, and prolonged periods of cool, bright, sunny weather without severe frosts. Frost is not essential; in fact, even in mid-summer an occasional weakened tree will color.

Autumn colors are grouped broadly below; variations are numerous: **Yellows:** green and black ash, basswood, beech, birches, butternut, elm, boxelder (ashleaf maple); mountain, silver, striped, and sugar maple; mountain-ash, poplar, serviceberry, willow, witch-hazel. **Reds and Scarlets:** hornbeam; red, mountain, and sugar maple; black, red, scarlet, and white oak; sumac, tupelo. **Browns:** black and white oak. **Purples:** white ash, witch-hazel.

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The above references are semi-technical to technical and are most effectively used under the guidance of one who has a background in botanical studies.

FORESTRY FACTS

1. The world's oldest living tree is believed to be a bristlecone pine (*Pinus aristata* Engelm.) at 4900 years of age in 1967, in the Snake Range of eastern Nevada. The tallest tree is believed to be a redwood (*Sequoia sempervirens* (D. Don) Endl.) at Redwood Creek, Humboldt County, Cal., at 368 feet in height. The largest tree is thought to be a giant sequoia (*Sequoia gigantea* (Lindl.) Decne.) in Sequoia National Park, Cal. at 83 ft. 11 inches in circumference at breast height.

2. Maine has a total of 17,748,000 acres of forest lands which comprise about 90% of the total land area.

3. The Forestry Department, headed by the Forest Commissioner, is charged with the protection of Maine's forests. This includes protection from fire, insects, disease, and the promotion of recognized cutting practices.

4. Farm or service foresters are available to give in-the-woods service and advice to woodland owners.

5. The Greenbush Nursery produces seedlings for reforestation.

6. The average annual estimated loss to the forests of Maine from insect attack amounts to over $4,000,000.

7. Diseases cause an equal, if not greater, additional loss.

8. About 28% of all wage earners in Maine are employed either in the woods or in the manufacture of forest products.

9. There are about 750 wood-using mills in Maine. They manufacture a total of 360 different wood products.

10. Since 1955 the Forestry Department has been authorized to issue permits for outdoor fires and camping on private land in the Maine Forestry District. Such permits are issued by the forest rangers, based on weather conditions.

11. The value of all products manufactured by forest-related industries in Maine is $950,000,000 which is 39% of Maine's total manufacturing economy.

HISTORY OF "FOREST TREES OF MAINE"

The first edition of this bulletin appeared in 1908 and was entitled "Forest-Trees of Maine - and How to Know Them," by Prof. G. E. Tower, of the For. Dept. at the U. of Me. Seven cuts were used from Sargent's "Manual of the Trees of North America", by permission of Houghton, Mifflin & Co.

The second edition was revised in 1917 by J. M. Briscoe, Prof. of Forestry and Harry N. Conser, Prof. of Botany, of U. of Me. New descriptive information and some exotic species were added for comparison.

The third edition appeared in 1925 with an enlarged and revised text and the addition of several species, original illustrations, and a complete index, presumably under the direction of Prof. Briscoe. The title was shortened to "Forest Trees of Maine" and has survived as such through all subsequent revisions. A feature of the third edition was an introduction by Governor R. O. Brewster. The fourth (1929) and fifth (1932) editions were essentially reprints of the third edition.

The sixth (1938) and seventh (1951) editions were revised by H. B. Peirson, retired State Entomologist of the Maine Forestry Department, and now deceased.

The eighth (1961) and ninth (1968) editions were revised by D. A. Stark, G. A. LaBonte, and R. W. Nash, Me. For. Dept. Major added features in 1961 were a Summer Key, Glossary, improved text on tree parts and functions, sketch of same by the late T. Bunker of Augusta, an account of National Arbor Day, and the poem "Trees" by Joyce Kilmer. Added in 1968 were sketches of protected and poisonous small trees or shrubs, more reference books, some "Forestry Facts", and "Social Register of Big Trees". The ninth edition was also the first issued as a numbered Bulletin.

All editions have had the same objectives, namely; accuracy and keeping pace with new findings.

NATIONAL ARBOR DAY

Title 1, M.R.S.A., Sec. 111 provides that the Governor shall annually proclaim the **last Friday in April** as National Arbor Day and recommend its observance by the public in the planting of trees, shrubs and vines, and in the promotion of forest growth and culture; and shall further recommend that such day be observed in schools by exercises appropriate to National Arbor Day.

Arbor Day was started in Nebraska on April 10, 1872 by J. Sterling Morton. It is purely American in origin, and is now observed in all states and many foreign countries.

Trees are living organisms which need care and attention to maintain their good health, beauty, and scenic values.

Arbor Day should be the concern of everybody as an ideal time to promote the planting, care, and protection of both shade and forest trees and to understand the benefits of trees to mankind, to soil, water, and wildlife. It is particularly fitting that the youth of Maine be given an opportunity through conservation education to learn more about trees and Arbor Day.

TREES

I think that I shall never see
A poem lovely as a tree.

A tree whose hungry mouth is prest
Against the earth's sweet flowing breast;

A tree that looks at God all day
And lifts her leafy arms to pray;

A tree that may in summer wear
A nest of robins in her hair;

Upon whose bosom snow has lain
Who intimately lives with rain.

Poems are made by fools like me
But only God can make a tree.

Joyce Kilmer

SOCIAL REGISTER OF BIG TREES*

The American Forestry Association conducts a nationwide program called the "Social Register of Big Trees" to identify and give recognition to the largest tree of various species growing in the United States.

The Maine Forestry Department is conducting a "Maine Social Register of Big Trees" and will welcome reports of large trees.

Below are listed the present (1972) national record holders for species commonly found in Maine.

COMMON NAME	CIRCUM @ 4½′	TOTAL HEIGHT	CROWN SPREAD	STATE
Balsam Fir	7′	116′	33′	Michigan
Striped Maple	3′11″	40′	50′	New York
Red Maple	16′3″	125′	108′	Michigan
Silver Maple	22′7″	125′	111′	Michigan
Sugar Maple	21′3″	78′	63′	Maryland
No. White-Cedar	11′7″	113′	42′	Michigan
Black Ash	15′3″	87′	66′	Ohio
Green Ash	14′8″	105′	79′	Missouri
White Ash	24′0″	80′	82′	Penn.
Bigtooth Aspen	17′2″	95′	82′	New York
Quaking Aspen	8′10″	106′	74′	Michigan
Amer. Basswood	22′3″	115′	76′	Michigan
American Beech	18′0″	108′	56′	Ohio
Yellow Birch	14′1″	90′	64′	Tenn.
Sweet Birch	15′2″	70′	87′	N. H.
PAPER BIRCH	18′1″	96′	83′	**HARTFORD, MAINE**
Gray Birch				
Boxelder	16′6″	95′	101′	Michigan
EASTERN HOPHORNBEAM	9′7″	78′	44′6″	**WINTHROP, MAINE**
Amer. Chestnut	18′5″	78′	91′	Oregon
Atl. White-Cedar	15′6″	87′	—	Alabama
Black Cherry	23′9″	114′	93′	Michigan
American Elm	22′2″	116′	86′	Kentucky
Slippery Elm	19′11″	90′	80′	Penn.
Honeylocust	17′0″	115′	124′	Michigan
TAMARACK	9′8″	95′	50′	**JAY, MAINE**

Eastern Hemlock	19′9″	98′	69′	Tenn.
Black Locust	20′3″	74′	44′	New York
No. Red Oak	26′3″	88′	88′	Ohio
Scarlet Oak	16′10″	65′	80′	New York
White Oak	27′8″	95′	165′	Maryland
Swamp White Oak	20′7″	104′	119′	Kentucky
Black Spruce	5′0″	82′	20′	Minn.
Blue Spruce	15′8″	126′	36′	Colorado
Red Spruce	13′10″	106′	45′	No. Car.
White Spruce	10′11″	103′	36′	Michigan
E. WHITE PINE	18′2″	147′	74′	**BLANCHARD, MAINE**
Jack Pine	6′9″	69′	36′	Minn.
PITCH PINE	11′4″	96′	50′	**POLAND, MAINE**
Red Pine	12′4″	90′	50′	N. H.
Scotch Pine	14′9″	63′	75′	Michigan
Canada Plum	4′2″	51′	48′	Michigan
Balsam Poplar	15′7″	98′	56′	Mass.
Staghorn Sumac	2′3″	49′	30′	Michigan
Black Willow	9′4″	40′	65′	Georgia
Pussy Willow	5′2″	40′	45′	Mass.
Poison-Sumac	3′1″	20′	25′	New York

* Determination of bigness is based on three key points. These are circumference, height, and crown spread. To the total *inches* of stem circumference, breast high (4½′ from ground line), is added the total height in *feet,* plus one-quarter of the crown spread in *feet.*

For further information contact: Division of Information and Education, Maine Forestry Department, Augusta, Maine 04330.

PROPERTIES OF WOOD

Wood, since the early recorded history of man, has served for building structures and for many other purposes useful to man. It is one of the most versatile of raw materials.

Some properties common to all woods are:

1. Wood as it comes from the living, standing tree, and when first sawn into boards is more or less saturated with water, and for most uses must be seasoned before further processing.
2. Wood that has been properly seasoned is light in weight, easily handled, and may be transported long distances at reasonable cost.
3. Wood expansion or contraction is little influenced by temperature changes.
4. Wood is a poor transmitter of sound, heat and electricity.
5. Wood members can be easily and securely fastened together with glues, nails, screws, and bolts.
6. Wood pores and fibers facilitate the holding of paint, lacquer, varnish and other finishing materials.
7. Wood may be worked into intricate shapes using simple tools.
8. Wood does not rust. Neither does it corrode in the presence of sea water.
9. Wood neither crystalizes nor becomes brittle like many metals subjected to repeated stress reversals.
10. Wood defects generally can be detected by visual means.
11. Wood is limited in its hardness.
12. Wood is an organic material and as such is often subject to decay and boring isects.
13. Wood is a combustible material.

FIREWOOD

Apple wood, when available, gives off much heat, has a pleasant scent, and is long lasting. White birch, which is highly prized for the fireplace because it sizzles and pops and has a bright flame, actually has a fairly low heat output. The prize for irritable wood smoke goes to poplar or aspen which doesn't burn well unless dry and has about half the heat output of apple. White pine although it gives an intense heat, is very short lasting and is one of the lowest BTU producing woods at 13,300,000 BTU's per air dried cord. Aspen, the lowest, produces 12,500,000 BTU's.

In Maine, the best firewood available in quantity includes beech, yellow and white birch, red oak, and soft and sugar maple. Other desirable species found in less abundance include white ash, white oak and hop-hornbeam. Maine is 90 per cent forested, which is the highest in the nation, and finding firewood usually isn't a problem.

If you own a woodlot, and have a chain saw, cutting your own firewood can be a lot of fun. Most wood lots need some type of improvement. Firewood can be a by-product. If you don't know which trees to cut, contact your local state service forester.

"WHICH WOOD BURNS BEST?"

Beech wood fires are bright and clear
If the logs are kept a year.
Chestnut's only good, they say,
If for long it's laid away.
Birch and fir logs burn too fast,
Blaze up bright and do not last.
Elm wood burns like a churchyard mould;
E'en the very flames are cold.
Poplar gives a bitter smoke,
Fills your eyes and makes you choke.
Apple wood will scent your room,
With an incense like perfume.
Oak and maple, if dry and old,
Keep away the winter cold.
But ash wood wet and ash wood dry,
A King shall warm his slippers by.

Adapted from "Practical British Forestry" by C. P. Ackers

SPECIES INDEX

SPECIES INDEX

GROUPS OF TREES AND SHRUBS INCLUDED

NATIVE CONIFERS (14)

Cedar:	Atlantic White	Pine:	E. White
	Eastern Red		Jack
	Northern White		Pitch
Fir:	Balsam		Red (Norway)
Hemlock:	Eastern	Spruce:	Black
Juniper:	Common		Red
Larch:	(Tamarack)		White

NATIVE BROADLEAF TREES (57)

Alder:	Speckled	Maple:	Black
Ash:	Black		Boxelder
	Green		Mountain
	White		Red
Aspen (Poplar):	Balsam		Silver
	Bigtooth		Striped
	Quaking		Sugar
Basswood:	American	Mountain-Ash:	American
Beech:	American		Showy
Birch:	Blueleaf	Nannyberry	
	Gray	Oak:	Bear
	Paper		Black
	Sweet		Bur
	Yellow		Chestnut
Butternut			No. Red
Cherry:	Black		Scarlet
	Choke		Swamp White
	Pin		White
Chestnut:	American	Plum:	Canada
Dogwood:	Alternate-Leaf	Rhododendron:	Rosebay
	Flowering	Sassafras	
Elm:	American	Serviceberry:	Downy
	Slippery		Allegheny
Hawthorn		Sumac:	Poison
Hickory:	Shagbark		Staghorn
Hop-Hornbeam:	Eastern	Sycamore:	American
Hornbeam:	American	Tupelo:	Black
Laurel:	Mountain	Willow:	Black
		Witch-Hazel	

EXOTIC SPECIES AND VARIETIES (29)

Beech:	European	Mountain Ash:	European
	Purple (Copper)	Pine:	Austrian
Elm:	Camperdown		Mugo
	Chinese		Scotch
	English	Poplar:	Balm-of-Gilead
	Scotch		E. Cottonwood
	Siberian		Lombardy
Horsechestnut			White (Silver)
Linden:	European	Spruce:	Blue
	Little-leaf		Norway
Locust:	Black	Tuliptree	(Yellow-poplar)
	Clammy	Walnut:	Black
	(Honeylocust)		Heart-nut
Maple:	Norway		Japanese
	Schwedler		

NATIVE SHRUBS, HYBRIDS AND VARIETIES (13)

Alder:	Downy Green	Juniper:	Ground
	Hazel	Oak:	Red var.
Aspen:	White-bark Quaking	Plum:	Beach
		Poison Ivy	
Birch:	Dwarf	Sumac:	Shining
	Dwarf Paper		Smooth
	Low		
	Mountain Paper		

Inch rule for measuring.

Leaf measurements do not include the petiole of simple leaves.

TO HELP KEEP MAINE GREEN

I WILL:

1. Always be careful with fire in the woods.
2. Put all matches, cigar, cigarette or pipe ashes and any burning materials in the ash tray of my car. Never flick or flip them out the window.
3. Never smoke in the dry woods, or in the fields; and always find a safe spot.
4. Build camp fires at authorized sites only, and put them totally out before I leave.
5. Notify the nearest forest fire ranger or telephone "Operator" if I see any forest or grass fire unattended.
6. Report insect and disease outbreaks to the State Entomologist when forests are endangered.

KNOW YOUR TREES THEIR VALUE AND IMPORTANCE